THE DOCK & HARBOUR AUTHORITY

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Editorial

Port of Grangemouth, Scotland.

The Port of Grangemouth, which is situated on the south bank of the Firth of Forth and about 10 miles west of the Forth Bridge, is the principal Scottish port of the London, Midland and Scottish Railway group.

Grangemouth has, from a very obscure beginning, risen to very great heights, principally due to the fact that it is the centre of a large industrial area which comprises the great coalfields of Stirlingshire and Lanarkshire, and the iron foundries and steel mills of Central Scotland.

The first mention of Grangemouth as a sea port was in 1777, but the first dock was not opened until 1843, this being a small dock of 4½ acres area, and known as the Old Dock. In 1859 another small dock of 3½ acres, known as the Junction Dock, was opened. This dock is 600 ft. long, 216 ft. wide, and has a length of quayage of 1,500 ft., and is used principally for the Scandinavian timber trade.

Grangemouth's ever-increasing trade, however, still demanded further extensions, and in 1867 the docks were taken over by the Caledonian Railway Company (now incorporated in the L.M.S. Group), and this Company, in 1876, commenced work on another new dock known as the Carron Dock. This was opened in 1882. The Carron Dock has a length of 1,950 ft., and is 450 ft. wide.

The construction of an extensive system of docks, channels and sea locks was commenced in 1898 and opened in 1906, the whole project costing £1,000,000, and giving an additional water area to the port of 93 acres. This new dock system is known as the New Docks, and consists of the Grange Dock, two channels and a large timber pond; the timber pond, however, is now being filled in owing to insufficient use.

The continual developments which have been undertaken at Grangemouth had, up to 1913, been instrumental in bringing the tonnage of imports and exports at the port up to a total of 3,889,944 tons, but the Great War caused the closing of the Grangemouth Docks to commercial traffic as the entire dock system was taken over by the Admiralty. Since the war, however, the London Midland and Scottish Railway Company has once again pursued its policy of dock improvements in an endeavour to regain the pre-war prosperity that Grangemouth had attained, and in 1934 the total imports and exports were just over 3,000,000 tons.

The principal imports at Grangemouth are crude oil, timber, iron ore, pig iron, steel and esparto grass, and the principal export is coal.

The Port of Grangemouth forms the supplement for this month's issue, and an illustrated article giving details of the port appears on another page.

Port of Cochin's Dredging Achievement.

A remarkable dredging achievement has just been accomplished at the Port of Cochin, where the dredger "Lord Willingdon," has recently completed dredging 1,850,000 cub. yds. of spoil in the short time of one calendar month.

Work was commenced on December 17th, 1934, and was completed on January 17th, 1935, and the 1,850,000 cub. yds. of spoil was all pumped ashore a distance of 3,000 ft. The channel, which leads from the open sea to the Port of Cochin is now three miles long, and the available depth of water is now 38 ft. at low water.

Improvements for landing cattle at Birkenhead.

Mersey Docks and Harbour Board is spending several thousands of pounds on the provision of new sheds, etc., in order to make better arrangements for coping with live-stock traffic at Woodside and Wallasey. Work is now in progress on altering the landing place for sheep. Sheds have been acquired at Shore Road and Morpeth Dock, Birkenhead, and these are being fitted with sheep pens and a few cattle pens.

By the new arrangements, dealers will be able to do their business at Woodside instead of having to go to Wallasey Lairages. The effect of these changes is to further emphasise the importance of the Birkenhead live-stock trade. When the work is completed it is expected there will be accommodation for the landing of 9,000 sheep a day. It is intended to close down the Wallasey Lairages and to concentrate the traffic, as far as possible, at Woodside.

Manchester Ship Canal.

Manchester Ship Canal Company reports an increase of 560,901 tons in the total toll-paying merchandise traffic, and one of £76,678 in the receipts from tolls, ship dues, etc., for 1934 (over the figures of 1933). Sea-borne traffic on which Ship Canal tolls were paid amounted to 5,776,819 tons, against 5,168,478 tons in 1933; the figure was the highest since 1930. Barge traffic, however, amounted to only 173,151 tons, against 220,591 tons in the previous year, and this figure was the smallest for any of the forty-one years during which the canal has been open for traffic.

There was an increase of £76,678 in the gross receipts, and one of £78,323 in the revenue before charging interest on loans and debentures.

Traffic receipts of the Ship Canal in January amounted to £162,305, as compared with £123,707 in December.

Port of Boston, U.S.A.

Plans were made some time ago for the construction of a free port at Boston, and more recently Mr. H. Fuglmeyer, General Director of the Free Port of Copenhagen, was invited to come over to America and give his opinion on the project. After studying the question for six weeks, the Danish expert now announces that he does not consider that there would be any justification for a free port at Boston, as the international trade through the port is inconsiderable. What is required, he continues, is the improvement of the existing harbour facilities, which are at present by no means adequate. This can, however, only be carried out, if the present harbour authorities are given wider powers and have more resources placed at their disposal. Mr. Fuglmeyer's candid report appears to have considerably dampened the enthusiasm for the free port project, and it is likely that the improvements he has advocated will soon be started.

The Dock and Harbour Authorities' Association.

The Dock and Harbour Authorities' Association held their annual general meeting for the year ending December 31st, 1934, on Wednesday, February 27th, when the annual report was presented and adopted.

Dr. Thomas Cowan, President of the Association, presided over the meeting, which was very well attended. During 1934 the Association comprised 52 authorities.

The officials for 1935 were appointed as follows:—

President, Sir Richard D. Holt, Bt. (Chairman of the Mersey Docks and Harbour Board); Vice-Presidents: The Rt. Hon. Lord Ritchie of Dundee (London), Mr. W. F. Robertson (Clyde), Sir Ernest Herdman (Belfast), Mr. Alfred Watkin (Manchester).

Lt.-Col. J. T. C. Moore-Brabazon, M.C., M.P., was again elected Parliamentary Chairman for the Association for 1935.

The following members were elected to the Executive Committee for the ensuing year:—

Sir Thomas Poole (North-East Coast of England); Sir David J. Owen (London District and South Coast); Mr. R. H. Jones (Bristol Channel); Mr. J. G. B. Beazley (Liverpool and North-West District); Mr. H. M. Gibson (Manchester Ship Canal); Mr. G. W. Service (West Coast of Scotland); Dr. Thomas Cowan (East Coast of Scotland); Mr. M. J. Watkins (Northern Ireland); and Mr. W. Hewat (Irish Free State).

Aden Port Trust

The returns of shipping using the Port of Aden for the month of December, 1934, are as follows:—

	No.	Tonnage
Merchant Vessels over 200 tons ...	131	562,822
,, ,, under 200 tons ...	3	486
Government Vessels	11	31,168
Dhows	118	5,225
PERIM.		
Merchant Vessels over 200 tons ...	14	44,529

The total value of imports, excluding Government Stores, was Rs. 46,81,000/-, as compared with Rs. 42,29,000/- for December, 1933, and of exports Rs. 27,11,000/-, as compared with Rs. 28,95,000/-.

The total value of both imports and exports together was Rs. 73,92,000/-, as compared with Rs. 71,24,000/- for the corresponding month last year.

Imports during the month were above those for December, 1933, in the case of coffee, seeds, grey, white and printed or dyed piece goods, unmanufactured and manufactured tobacco, and private treasure; and below, in the case of grain, pulse and flour, gums and resins, hardware, raw hides, raw skins, sugar and twist and yarn.

Exports were above those for December, 1933, in the case of raw hides, seeds, raw skins, printed or dyed piece goods, manufactured tobacco, and private treasure; and below, in the case of coffee, grain, pulse and flour, gums and resins, hardware, sugar, grey and white piece goods, twist and yarn, and unmanufactured tobacco.

TRADE OF THE PORT.

Article.	Unit	Imports		Exports	
		Quantity.	Value Rs.	Quantity.	Value Rs.
Coal	Tons	4,261	85,215	0	0
Coffee	Cwts.	8,320	2,36,212	5,646	2,01,394
Grain, Pulse and Flour	,,	39,907	1,81,458	21,933	1,04,145
Gums and Resins	,,	1,559	26,722	2,035	39,110
Hardware	—	0	23,079	0	20,433
Hides, raw	No.	1,540	2,408	6,327	4,428
Oil, Fuel	Tons	60,030	15,00,750	0	0
,, Kerosene	Gls.	42,365	27,241	2,672	1,846
,, Petrol	,,	27,418	27,773	8,440	8,790
Salt	Tons	0	0	16,350	1,62,975
Seeds	Cwts.	5,060	36,678	1,726	14,999
Skins, raw	No.	400,580	1,92,831	601,894	4,31,425
Sugar	Cwts.	34,767	1,53,248	16,036	75,903
Textiles—					
Piece Goods, Grey	Yds.	3,193,282	4,42,867	2,773,917	3,55,708
,, ,, White	,,	432,315	76,676	205,000	33,035
,, ,, Printed or Dyed	,,	1,458,338	2,65,494	1,560,005	3,37,184
Twist and Yarn	Lbs.	126,400	51,953	83,893	37,159
Tobacco, Unmanufactured	,,	544,684	73,116	387,072	67,488
,, Manufactured	,,	69,824	47,639	30,252	18,736
Other Articles	No. of Pkges.	79,629	10,02,585	30,495	4,66,980
Treasure, Private	—	0	2,26,965	0	3,29,730
Total ...	—	—	46,80,910	—	27,11,468

The number of merchant vessels over 200 tons that used the Port in December, 1934, was 131, as compared with 129 in the corresponding month last year, and the total tonnage was 563,000, as compared with 569,000.

Excluding coal, salt, fuel oil and Military and Naval Stores and Transhipment Cargo, the total tonnage of imports in the month was 10,400 and of exports 5,900, as compared with 12,200 and 6,700 respectively for the corresponding month last year.

Clyde Navigation Trust

Proposed Industrial Development of Shieldhall Dock Estate

It was reported at the last meeting of the Clyde Navigation Trustees that the Special Committee on the Shieldhall and Renfrew Docks Scheme had, in accordance with the motion proposed by Mr. Hector McNeill, one of the Corporation Members, given consideration to the utilisation of the undeveloped land on the South bank of the River Clyde as an industrial estate to attract new industries and trade to the Clyde area, and that it was remitted to the Officials of the Trust to submit a report on the subject of future dock extension and as to the disposal of any portions of land thought to be necessary for that purpose. It was also reported that a Committee had sat and considered two other items of the motion proposed by Mr. McNeill, namely: (1) Schemes for the improvement of shipping, ship-building and ship repair facilities on the Clyde; and (2) the reconstruction of docks including a provision of more graving dock accommodation. These matters were also continued for further consideration pending a further report to be prepared on the whole matter.

Since then, Treasurer P. J. Dollan, of the Glasgow Corporation, in conjunction with Mr. Hector McNeill as it is reported, submitted a comprehensive memorandum dealing generally with Mr. McNeill's motion which recommends, in addition to the attraction of new industries to the Shieldhall estate, the deepening, widening and straightening of the river at certain points, the overhaul and improvement of dock facilities generally, and more intensive action in connection with the development of the trade of the port and the provision of more graving dock accommodation.

Laid-up Vessels

The Clyde Trustees have agreed to an amendment of their dues in respect of vessels laid up for exceptional periods where, in the event of any vessel which had previously been a regular trader to the port remaining in the first stage of the river for a period of twelve months or more beyond the free period of thirty-one days, the extra time dues payable after the first chargeable six months is to be one-halfpenny per net registered ton per week in place of the scheduled rate of twopence per ton per week, the Trustees giving no guarantee of accommodation and reserving their powers and that of the Harbour Master as to the berthing and moving of vessels.

Port of London's Shipping

During the week ended February 8th, 1,211 vessels, representing 888,219 net register tons, used the Port of London. 455 vessels (646,043 net register tons) were to and from Empire and Foreign Ports, and 756 vessels (242,176 net register tons) were engaged in coastwise traffic.

Fourteen timber-laden vessels docked with 21,813 tons of softwood.

* * * *

During the week ended February 15th, 1,131 vessels, representing 1,056,731 net register tons, used the Port of London. 489 vessels (815,286 net register tons) were to and from Empire and Foreign Ports, and 642 vessels (241,245 net register tons) were engaged in coastwise traffic.

Sixteen timber-laden vessels docked with 13,320 tons of softwood.

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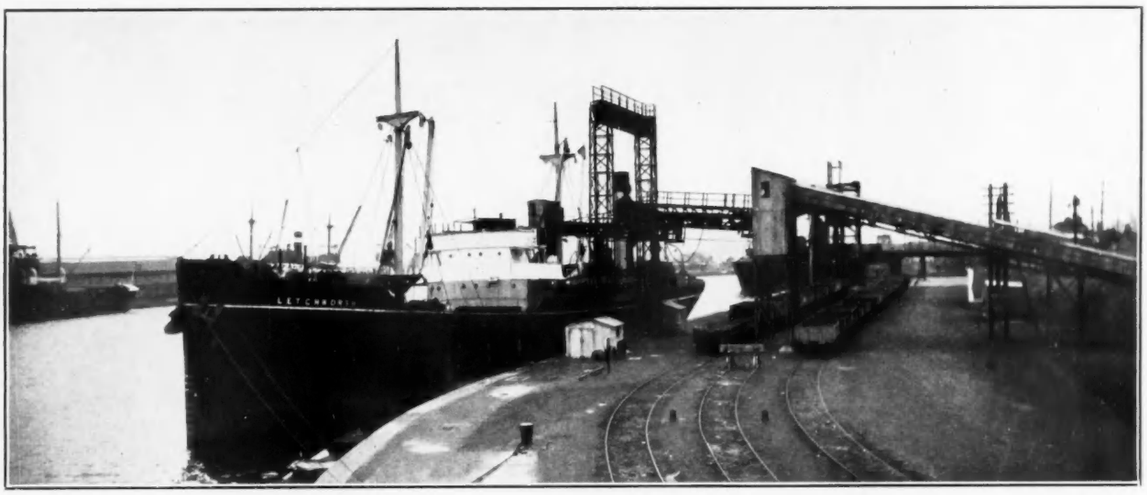
During the week ended February 1st, 988 vessels, representing 961,880 net register tons, used the Port of London. 431 vessels (744,119 net register tons) were to and from Empire and Foreign Ports, and 557 vessels (217,761 net register tons) were engaged in coastwise traffic.

Thirteen timber-laden vessels docked with 12,783 tons of softwood.

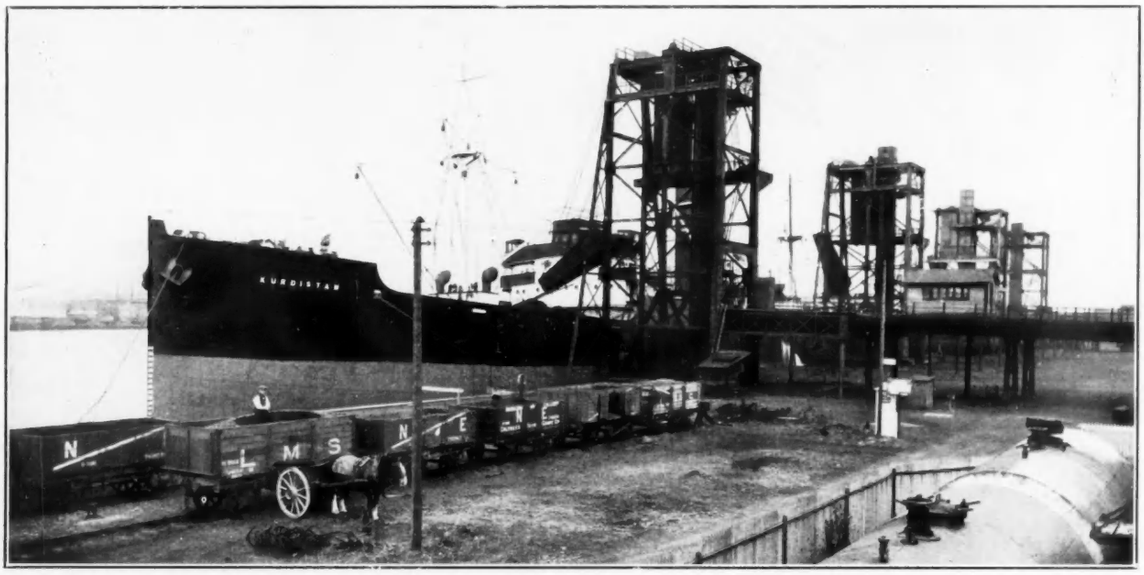
Record at Tilbury.

A record traffic for the month of January was dealt with at the Tilbury Passenger Landing Stage when vessels totalling 366,160 gross register tons used the stage and embarked or disembarked 4,286 passengers, in addition to large quantities of baggage and mails.

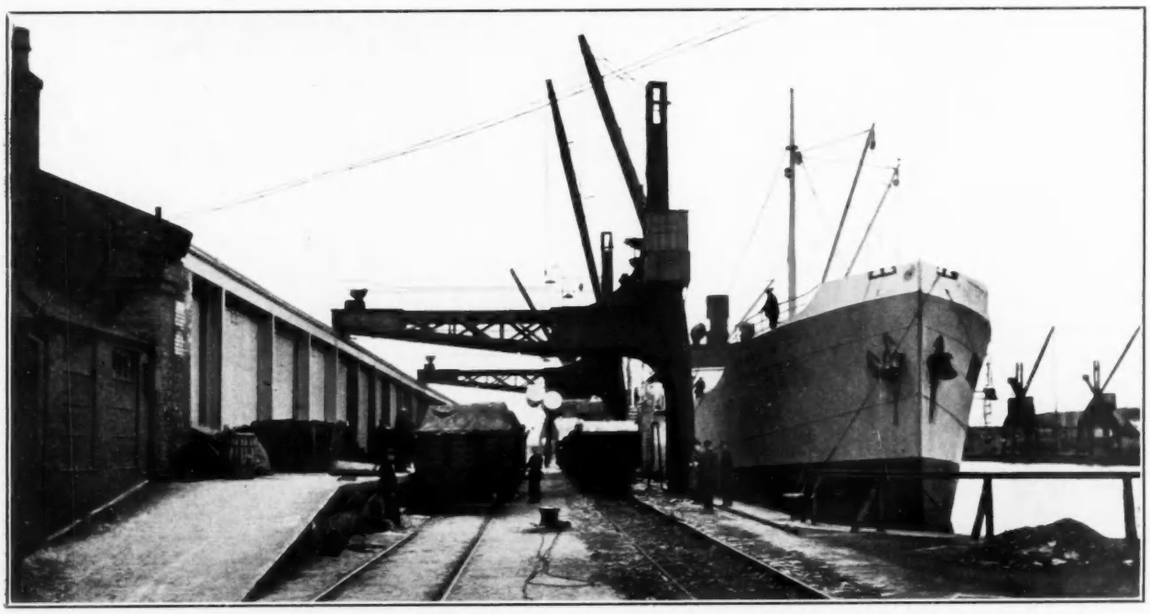
Port of Grangemouth, Scotland



Carron Dock, Grangemouth. Ship Loading at No. 1 Coal Conveyor.



Grange Dock, Grangemouth. Coal Hoists (steamer coaling), Rail Side.

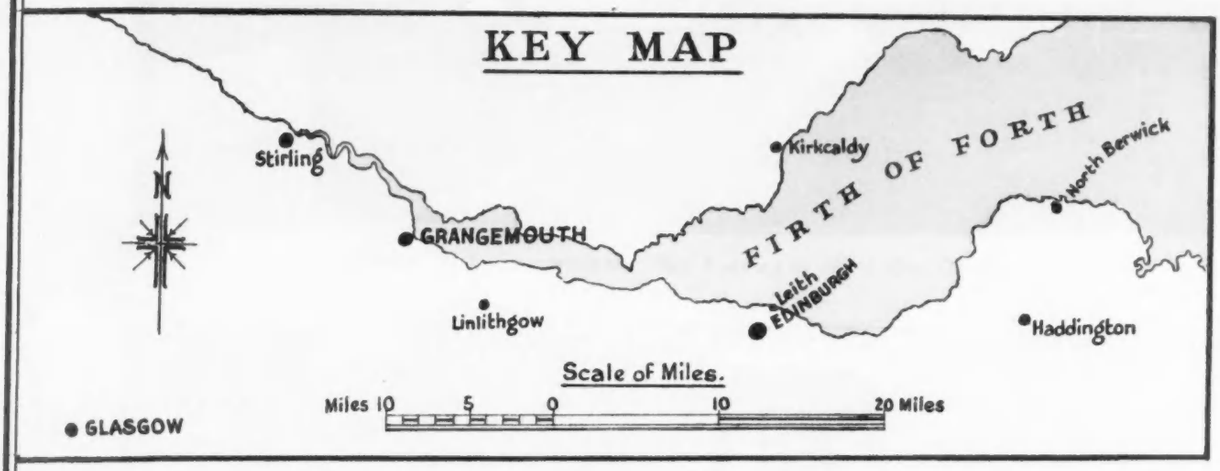


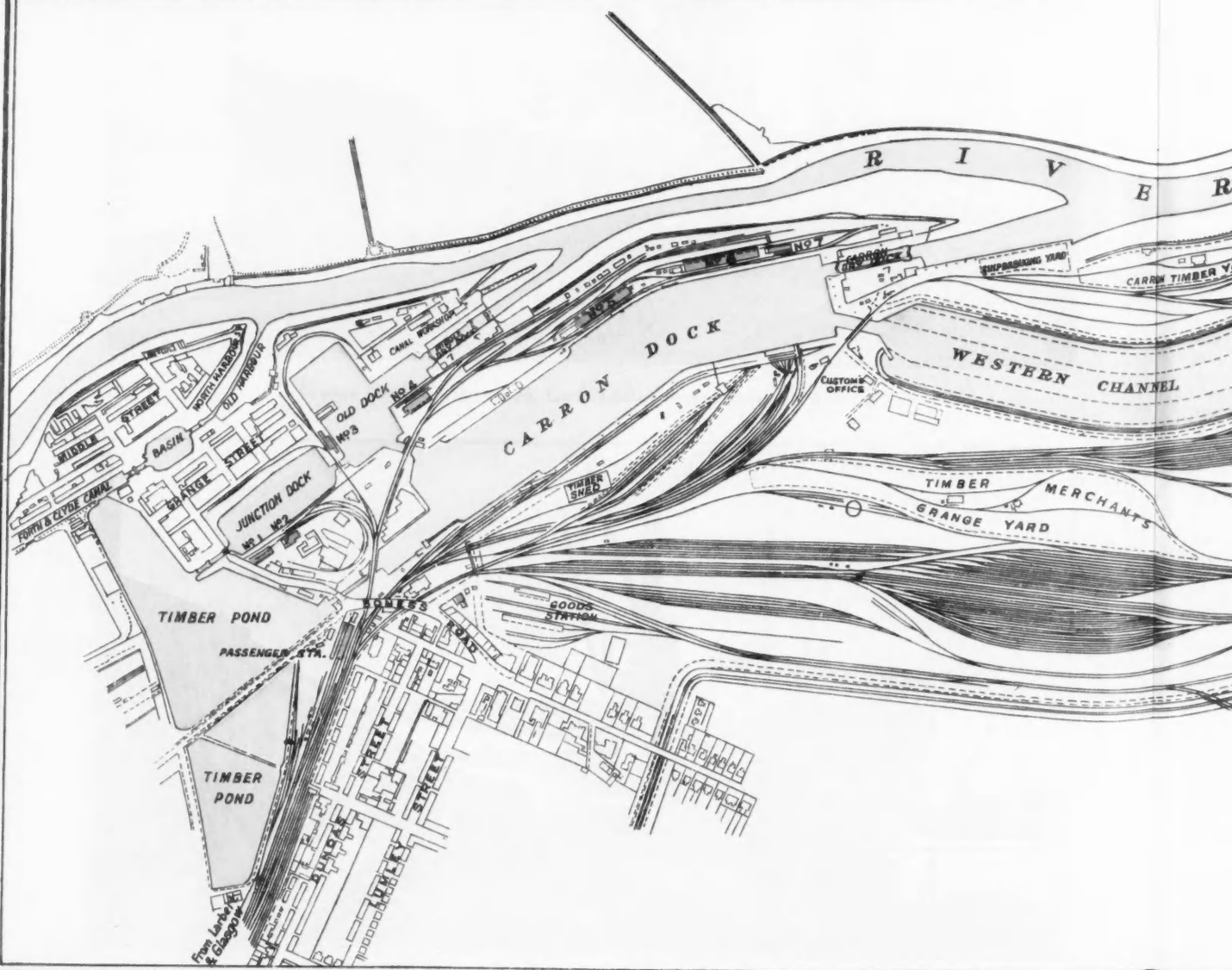
Grange Dock, Grangemouth. View of Norway Steamer Berth.

Rocky Harbour Authority Supp.
Mar 1935

GRANGEMOUTH DOCK

UNDER THE JURISDICTION OF THE LONDON, MIDLAND & SCOTTISH RAILWAY





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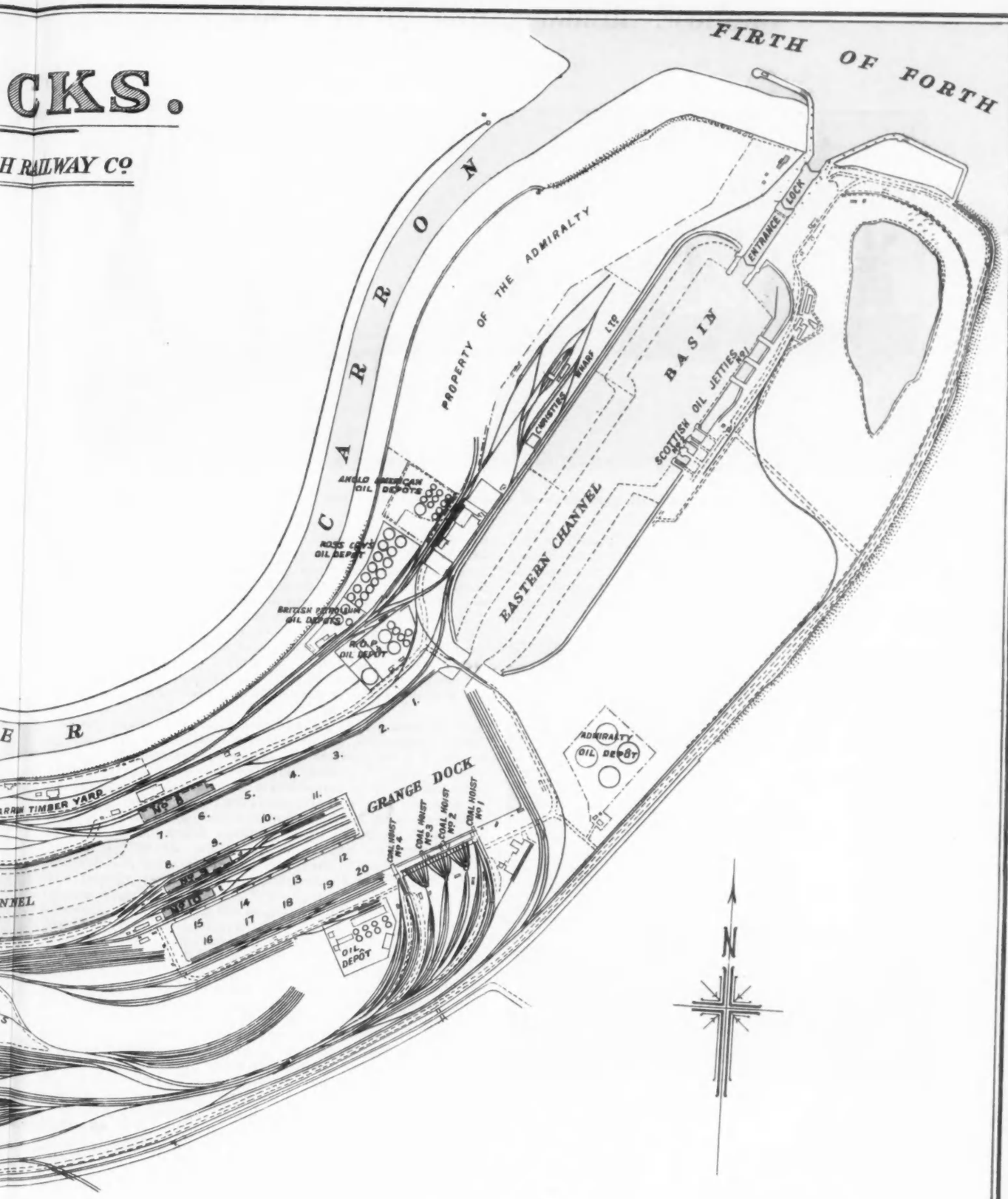


The Port of Grangemouth, Scotland

By JOHN ANDERSON

Grangemouth. General View of the South Side of Grange Dock, showing the Four Modern Coal Loading Hoists.

ONE of the most progressive and up-to-date seaports on the East coast of Scotland is Grangemouth, a comparatively small industrial town with extensive docks situated on the south bank of the Firth of Forth, some ten miles west of the Forth Bridge. The port forms the terminus of the now antiquated Forth and Clyde Canal, which stretches from Grangemouth to Bowling, a little port on the Firth of Clyde. It is to this canal, when times were more prosperous than they are to-day, that Grangemouth mainly owes her rise and rapid progress from a mere river creek to a system of docks having a water area of nearly one hundred acres.

Grangemouth first came into existence as a seaport as long ago as 1777, when Sir Lawrence Dundas, a prominent landowner in the locality, opened the Old Harbour, as it is termed to-day. This is simply a small tidal basin in the River Carron, forming the canal terminus and situated west of the older portion of the docks. This creek, for it is little more, soon built up a flourishing coastwise trade, but its prosperous days really began in earnest when the Forth and Clyde Canal was opened in 1790, the whole task of construction having occupied the best part of twenty-three years. The first vessel to pass through the canal from Grangemouth to the Clyde was the coasting sloop "Agnes," on passage from Leith to Greenock, thus avoiding the long and hazardous voyage round Northern Scotland. An interesting craft to be seen regularly in the harbour at the beginning of the 19th Century was the pioneer steamboat, "Charlotte Dundas," when she was employed in towing sloops and barges through the canal. For many years Grangemouth was little more than a port of call for canal traders; but, as time went on, larger ships, mainly sailing vessels from Baltic ports, began to arrive regularly, and the need for more extensive harbour accommodation became a pressing problem. Another obstruction to the progress of the port was the shallowness of the river, which was continually silting up with mud, thus making navigation only possible for very small vessels.

In 1841, the present Old Dock was begun and formally opened in 1843. This is a small dock of 4½ acres, situated east of the harbour and to which access to the River Carron was gained by a single lock. It has a total length of 786 ft. with a breadth of 300 ft. and a depth of 19 ft. This dock at once drew considerable traffic to the port, but still it was insufficient, and soon another extension was decided upon.

In 1859 a small dock of 3½ acres, known as Junction Dock, was opened, together with three commodious timber basins, as the Scandinavian timber trade was, and is still to-day, the port's mainstay. Junction Dock is 600 ft. long, 216 ft. wide, and length of quayage is 1,500 ft. Even this extension was not sufficient to cope with Grangemouth's growing trade, and in the summer months, especially when the timber season was at its height, both docks were continually thronged with tiers of sailing vessels of all types and sizes. In those days, each ship usually took at least a fortnight to discharge a cargo of wood, so these were indeed palmy days for dock-side workers. In 1867 the entire canal and both docks were taken over by the Caledonian Railway Company (now incorporated in the L.M.S. group), and in that year 464,000 tons of shipping were handled at the port, quite a respectable total for docks of only eight acres in extent. Trade continued to improve to a gratifying extent and, in 1874, the amount of tonnage arrived and cleared was no fewer than 759,000 tons, and the need for further dock accommodation was once more urgent.

Grange Dock, Grangemouth. 35-ton Coaling Crane loading vessel. Lifting wagon from rail.

In 1876 work was begun on Carron Dock adjacent to Old Dock, and this extension was formally opened on June 3rd, 1882. This dock was a distinct advance, being 1,950 ft. long, 450 ft. wide, with a maximum depth of 23 ft. and a total area of 28 acres. It was equipped in the most up-to-date fashion of these days with hydraulic cranes and hydraulic coal-loading hoists. Tonnage handled at Grangemouth totalled, in 1882, 858,000 tons, and with the opening of Carron Dock the port quickly sprang to prominence as a coal port. Yet entrance to the docks was still made from the Carron River only and, owing to mud silting, it was impossible to maintain a depth of 25 ft. in the river, despite constant fruitless dredging. As a result, large ships were unable to use the port and had to anchor off the river mouth and lighter their cargoes ashore. On one occasion a coasting steamer, appropriately named "The Bull," collided with the entrance locks and burst them, leaving every ship then in port high and dry at low water. By 1896 the tonnage using the port had risen to 2,418,878 tons, mostly

Port of Grangemouth, Scotland

Grangemouth. New Wall Berth, Carron Dock. Vessel discharging Timber to Railway Waggons by Hydraulic Cranes. This Dock has now been fully equipped with Modern Electric Level Luffing Cranes.

Grangemouth. Carron Dock, looking East. Vessel discharging Heavy Machinery to Railway Waggons.

Port of Grangemouth. Scotland—continued

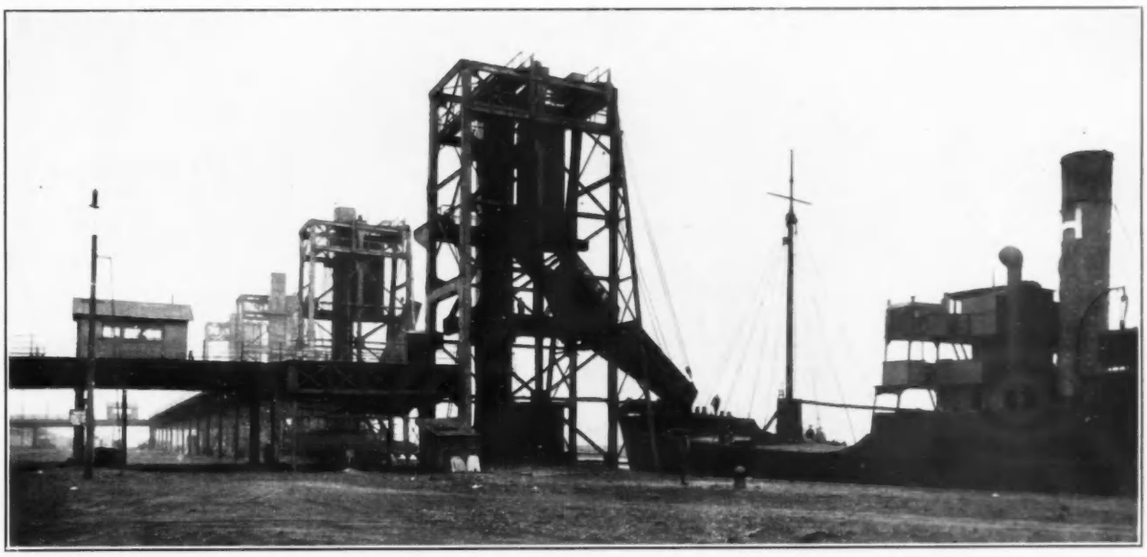
comparatively moderate-sized ships, but it was then recognised that if Grangemouth was to become a really important seaport she must have much more extensive dock accommodation and direct access to the port from the Firth of Forth to allow large-sized vessels to enter.

Accordingly, an extensive system of docks, channels and sea-locks, having a water area of 93 acres, was commenced in 1898, and completed by 1906, the whole scheme involving an expenditure of one million pounds. This dock system, generally known as the New Docks, consists of the Grange Dock (30 acres), two canting channels covering a total area of 40 acres, and a large 23-acres timber pond, which latter, however, is now being filled in as superfluous to the needs of the port.

Grange Dock.

(1) Four hydraulic coal hoists, lifting capacity 32 tons each, with a maximum working height of 43 ft. above water level.
(2) One 35-ton coaling crane (electric).
(3) Two 7-ton electric luffing cranes.
(4) Four 5-ton hydraulic cranes.
(5) Twenty-three 2-ton hydraulic cranes.
(6) Three 35-cwt. hydraulic cranes.

In this dock there are three large sheds, having a total capacity of 925,000 cub. ft. Grange Dock is 2,070 ft. in length, and 755 ft. wide, maximum depth being 26 ft.



Grange Dock, Grangemouth. Coal Hoists (steamer coaling), Rail Side.

The three entrance locks measure 626 ft. overall and 80 ft. wide, allowing the largest class of cargo traders to enter the port. This great dock extension gave a decided impetus to Grangemouth's trade and, in 1913, the amount of tonnage handled rose to the imposing total of 3,889,944 tons. The peak year was 1910, when 3,890,130 tons of imports and exports were handled.

The Great War, however, completely paralysed Grangemouth's trade, as the complete dock system was taken over by the Admiralty in November, 1914, and used as a base for mine-layers and other naval craft, while considerable quantities of floating mines were manufactured at the naval mining depot in the New Docks. While hostilities lasted, no cargo vessel was permitted to approach within one mile of the Forth Bridge, with the result that traffic for the port was mostly diverted to Leith.

However, since the War, the L.M.S. Company has spent a considerable amount of money on dock improvements at Grangemouth, and made it one of the most modern of Scottish seaports, though it can hardly be said it is as prosperous to-day as it was in 1913, but for that we must blame the times we live in and certainly not the enterprising authorities of this most progressive seaport. Shortly after the Great War, a large electric coaling crane of 35 tons lifting capacity was installed on the north side of Grange Dock, and some time later two seven-ton electric luffing cranes were added to this quay for rapid handling of pig iron cargoes, an important item in Grangemouth's long list of imports. The 35-ton crane, which was constructed by Stothert and Pitt, Ltd., Bath, is one of the largest dock-side appliances of its kind in Eastern Scotland. The port's latest acquisition is an electric coal-loading transporter of the most modern type, which was installed in Carron Dock two years ago, replacing two of the old-type hydraulic hoists. This transporter cost £30,000 to build, and its loading capacity is 700 tons per hour. It was constructed by Henry Simon, Ltd., Stockport, and has proved a wise investment and a decided asset to the port. The work of electrifying the entire dock system has been begun, and the old hydraulic cargo handling plant in Old Dock, Carron Dock and Junction Dock has been almost entirely replaced by up-to-date electric cranes. The two remaining hydraulic coal hoists in Carron Dock will be replaced by an electric transporter in the near future. It is hoped, shortly, to extend this ambitious electrification scheme to the New Docks, and when it is completed Grangemouth will certainly be in the front line of Scottish seaports.

The dock-side appliances in use at the various docks to-day are as follows:—

Carron Dock.

(1) Two hydraulic coal hoists of 24 tons capacity and a maximum working height of 24 ft. (to be displaced by an electric conveyor).
(2) One electric coal conveyor (loading capacity 700 tons per hour).
(3) Eleven 2-ton electric luffing cranes.
(4) Two 3-ton electric luffing cranes.
(5) Four 5-ton electric luffing cranes.
(6) One 35-cwt. hydraulic crane.
(7) One 2-ton hydraulic crane.
(8) One 12-ton hydraulic crane.

Carron Dock has also ample shed accommodation with a total storage capacity of 365,000 cub. ft.

Old Dock.

(1) One 15-ton steam crane (for handling buoys and other heavy lifts).
(2) Two 3-ton electric luffing cranes.

This dock has two sheds, with a combined capacity of 68,200 cub. ft.

Junction Dock.

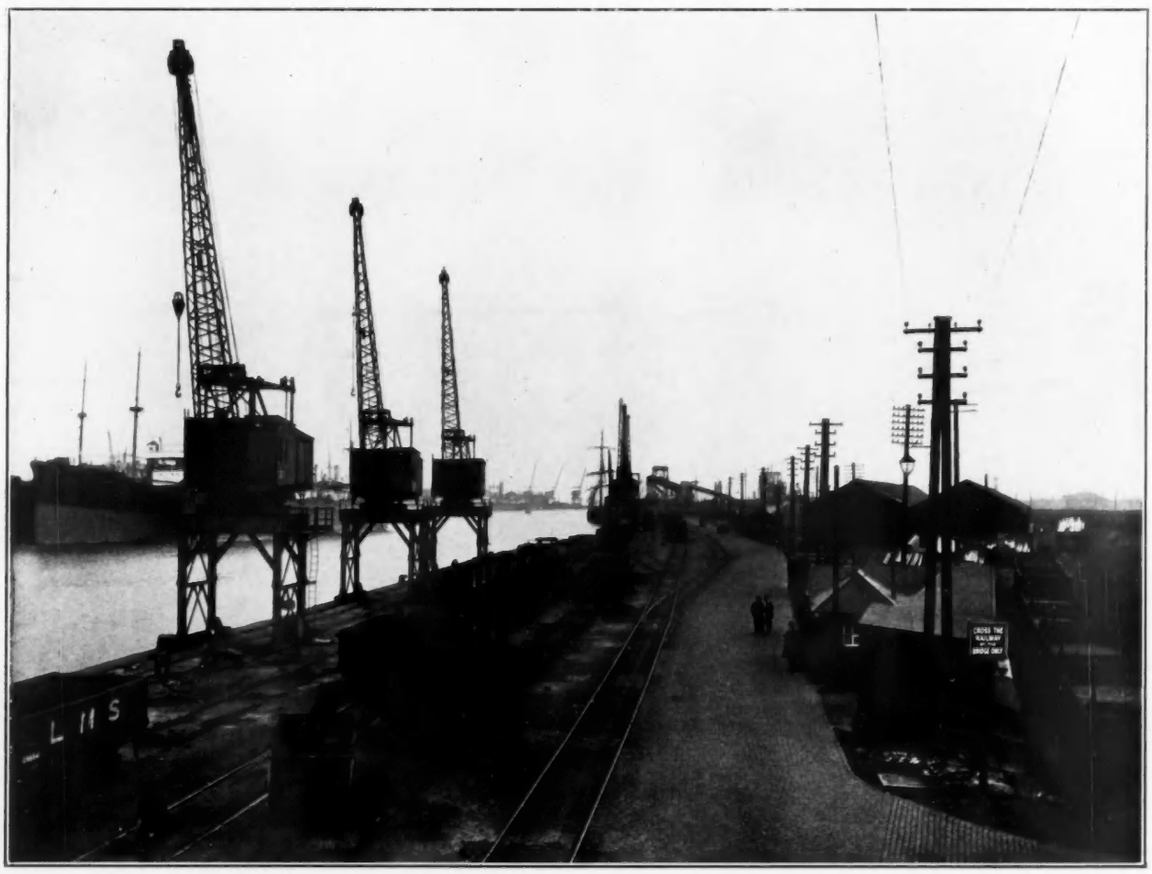
(1) Two 3-ton electric luffing cranes.
(2) One 35-cwt. hydraulic crane.

Junction Dock has a total storage capacity of 61,900 cub. ft. (two sheds). There are 81 miles of railway sidings at Grangemouth, 15 miles of which being actually alongside the quays.

The importation of crude oil from the Persian Gulf is one of the mainstays of the port, and the discharging facilities for oil tankers are most modern, like everything else at Grangemouth. Extensive oil jetties, capable of accommodating the largest ships owned by the British Tanker Company, Limited, are situated in the East Channel between the dock gates and Grange Dock. The cargoes are pumped ashore from there to the extensive tanks and oil refinery owned by Scottish Oils, Limited, situated on the foreshore to the east of the docks. This concern is the source of supply of motor spirit for practically the whole of Scotland. In addition, the Anglo-American Oil Company and Russian oil interests have refineries in the port, and cargoes for these firms are usually pumped ashore into tanks adjacent to the Grange Dock. At time of writing, news has come to hand that an extensive plant for the distillation of heavy oil from coal may be installed at Grangemouth in the near future. It is said that the installation will cost about one million pounds.

Port of Grangemouth, Scotland

Carron Dock, Grangemouth. Steamers discharging and loading in Hamburg and Rotterdam Berth.



Carron Dock, Grangemouth. South Side Roadway from Level Crossing Bridge.

Port of Grangemouth, Scotland—continued

The principal imports of Grangemouth are timber, iron ore, pig iron, steel and esparto grass and, of course, the most outstanding export is coal. The port now depends mainly on the Baltic timber season for its briskest period of activity. The iron ore trade is also important, and that commodity is usually expeditiously handled by means of grabs. During 1934 several large cargoes of iron ore were brought in from the Pepel district of West Africa as well as from Narvik and North Africa. In normal times enormous amounts of pig iron and steel are imported, mainly from continental ports, and most of these cargoes are absorbed by the numerous iron foundries and steel mills in Central Scotland.

version contracts, several ships having to be almost completely rebuilt.

In the old sailing-ship days, the local tug owners (Grangemouth and Forth Towing Company) are said to have owned at least thirty tugs, and they were always well employed. This Company now owns a fleet of six fairly modern screw and paddle tug boats, though towing jobs are not now so plentiful as they were in bygone days. The largest of their vessels is the two-funnelled screw tug "Dundas," formerly the well-known Dutch deep-sea salvage vessel "Atlantic," and their most recent acquisition is the large paddler "Elie," formerly a Fishguard passenger tender.

Grangemouth Docks. Entrance looking towards Docks. Gates Open.

The statistics for the Port of Grangemouth as regards net registered tonnage, imports and exports, for various years since 1900, are as follows:—

Year	Net Registered Tonnage	Imports	Exports	Total
1900	1,269,489	837,107	2,006,168	2,843,275
1905	1,275,006	1,327,883	1,516,573	2,844,456
1910	1,682,727	1,356,248	2,533,882	3,890,130
1920	886,674	991,376	856,983	1,848,359
1925	1,552,148	1,772,254	1,676,407	3,448,661
1930	1,551,687	1,905,820	1,608,634	3,514,454
1931	1,314,702	1,373,498	1,530,046	2,903,533
1932	1,368,096	1,385,971	1,711,319	3,097,290
1933	1,320,529	1,283,460	1,557,461	2,840,921
1934	1,455,397	1,603,575	1,452,044	3,055,619

The port was closed to Merchant Shipping during the War.

Grangemouth also boasts of a well-equipped shipyard, owned by Grangemouth Dockyard Company, Limited, which also owns the three dry docks in the port, one being situated at the yard in Carron River, and the others in Old Dock and Carron Dock respectively. The shipyard dock measures 266 ft. by 38 ft. and, like the others, it is fully equipped with electric cranes, electric winches and a compressed air plant. Some years after the Great War, the entrance to the Old Dock was converted into a graving dock, known as the Middle Dry Dock, which has an overall length of 335 ft. and a breadth of 50 ft. The largest of the trio is Carron Dry Dock, situated at the head of Carron Dock, 350 ft. in length and 50 ft. wide. Grangemouth Dockyard Company at present concentrates mainly on ship-repair work, as for some time orders for new vessels have indeed been few and far between. During the past ten years, this firm has completed many really extensive repair and con-

As regards dredging plant, we have the large twin screw hopper dredger "Carronwater," 1,232 tons gross, one of the biggest vessels of her type operating on the East coast. In addition, the port also owns the small grab dredger "Caledonian," which is usually employed in maintaining the Carron River navigation.

Chiefly owing to its geographical situation, Grangemouth has many distinct advantages over most seaports in Scotland, and the Dock Authorities have not been slow in making full use of them. These natural assets may be briefly summarised as follows:—

(1) The port is the terminus of the Forth and Clyde Canal, which gives direct communication with Glasgow and affords the cheapest form of transport between the docks and the many manufacturing districts along its route.

(2) Placed as it is, Grangemouth is the natural outlet for the great coalfields of Stirlingshire and Lanarkshire, the iron foundries and steel mills of Central Scotland and the important light castings industry of Falkirk and district. Practically every important Scottish industrial centre is situated within a radius of thirty miles from Grangemouth Docks.

(3) As I have shown, the dock facilities for rapid handling of freight traffic of all kinds are unequalled, and goods can be expeditiously transported by excellent rail or road services to all parts of the country.

When the long-looked-for business revival comes to this country (and it cannot come too soon) I am fully confident that the Port of Grangemouth will enjoy her full share of returning prosperity, and the vast sums spent on modernisation will not have been spent in vain. Soon the spectacle, all too frequent nowadays, of empty berths and unemployed ships will be a thing of the past. Come when it may, Grangemouth is fully prepared for trade revival, thanks to the energetic efforts of the "powers that be."

Irish Harbour Matters

Dublin Port Revenue Increased.

A TOTAL sum of £86,802 was collected as dues on goods in the Port of Dublin during 1934. This is an increase of £7,033 on the amount of dues collected in 1933.

This statement was made by Mr. E. H. Bailey, Secretary to the Dublin Port and Docks Board at the second meeting of the newly-elected Board, Mr. T. F. Laurie, chairman, presiding.

The inward amount of dues on goods was £66,893, showing an increase of £6,787, while the outward figure was £19,909, being an increase of £246, as compared with 1933; 299 foreign vessels entered the Port in 1933, and one less, or 298 in 1934. Of cross-channel and coastwise vessels there was a falling off to the extent of 274 vessels, only 3,740 vessels entering the Port during 1934.

Although the number of foreign vessels was one less than the previous year, there were large increases in tonnage and duties collected.

Foreign trade tonnage entering Dublin amounted to 1,120,118 tons, on which duty was collected to the sum of £41,539, or £6,229 more than in 1933.

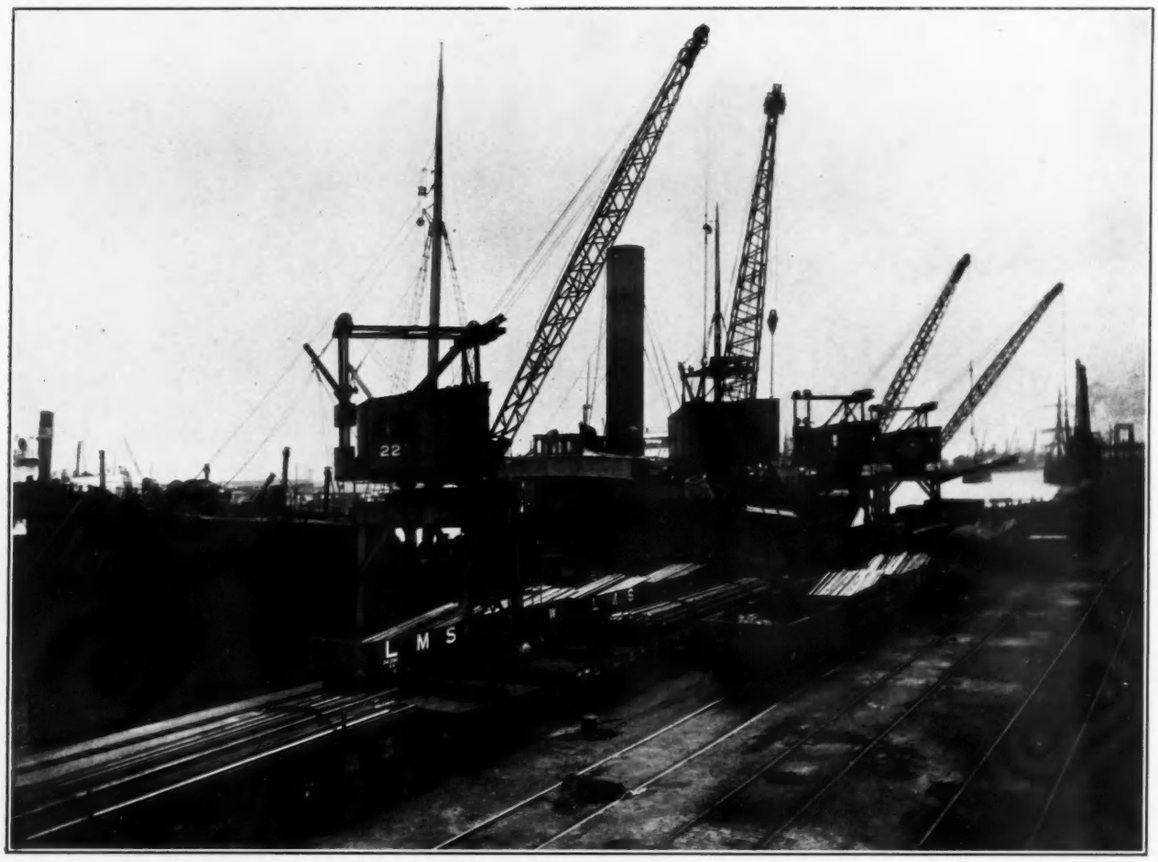
There was, however, a decrease in cross-channel and coastwise tonnage of 43,959 tons, the total for 1934 being 1,439,967 tons, and the duties were down by £1,168, the total collected on these vessels being £38,963.

The number of British and Irish steamers which visited Dublin last year fell off, as compared with 1933. There were 45 fewer British, at the total of 2,312 in 1934, while the Irish steamers were 22 fewer, the total being 230. The total tonnage of the British steamers was 1,139,130 tons, or 21,183 tons lower, and the duty collected was £31,121, a decrease of £543.

The tonnage of the Irish steamers was 47,723 tons, a decrease of 8,177 tons, and the amount collected as duty was £4,294, or £203 less than in 1933.

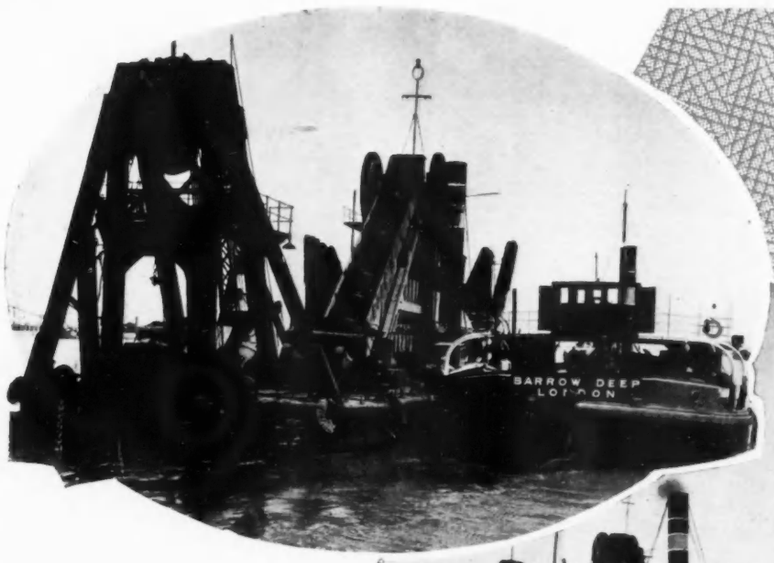
The statement was adopted.

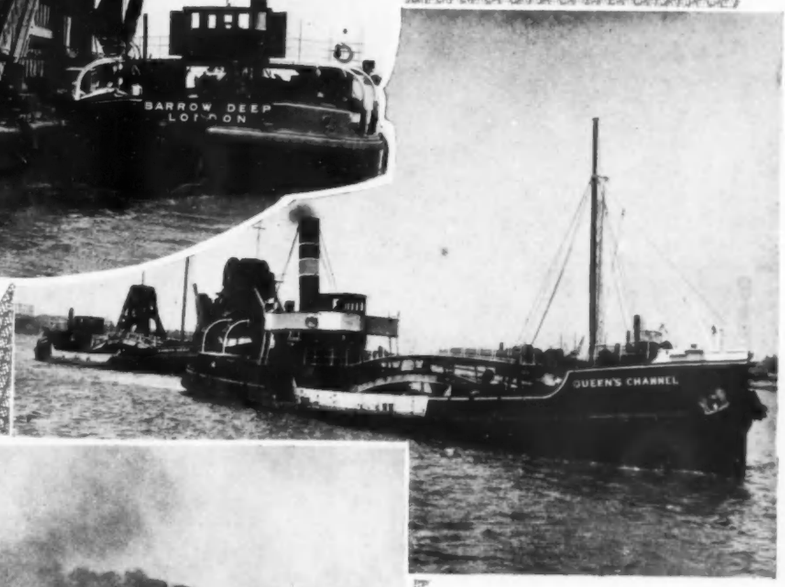
Port of Grangemouth, Scotland

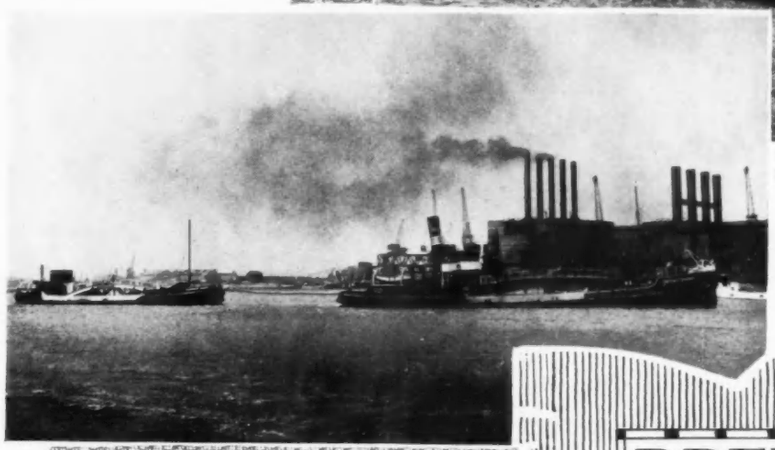


Carron Dock, Grangemouth. New Quay Wall Berth. Steamer discharging ex Antwerp.

Grange Dock, Grangemouth. 35-ton Coaling Crane loading Vessel. Wagon Tipping into Hold.







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The Inventor of the Screw-Pile

ALEXANDER MITCHELL, C.E., of Belfast

By COLIN JOHNSTON ROBB

THERE are few members of the civil engineering profession, especially those who have been connected with marine structures, who have not heard of the noted Alexander Mitchell, the blind engineer, who invented the screw-pile and was commonly called "Screw Mitchell." This nickname was attached to him perhaps due to a remark of Admiral Sir Francis Beaufort, who referred to him as "the apostle of screw-piles." Mitchell was born in William Street, Dublin, on the 13th April, 1780, being the eighth son of William Mitchell, Esq., Inspector General of Barracks in Ireland. When he was but seven years old his father removed to a seat called Pine Hill, near Belfast. Here the noted engineer received his first lessons from a private tutor, and afterwards attended school. Later, he went to the Belfast Academy, and was there under the tuition of the celebrated educationist, Dr. Bruce.

Unfortunately, young Mitchell's sight was noticed to be slightly affected when he was about six years old, and this weakness, which afterwards developed into what oculists call amaurosis, or a disease of the optic nerve, which caused him to become stone blind in his twenty-first year. Notwithstanding his failing sight, he received a sound education, and even in the days of his total blindness he advanced in knowledge in the field of higher mathematics and science up-to-date.

At the age of twenty-one, Mitchell got married to a young lady called Mary Banks, the match being considered by his mother a misalliance. It would appear that though he was of good family he had a great struggle to gain a livelihood in his early years. We find him writing to his brother George, begging him to advance him £100 in order that he might commence to make thread or brick. It seemed to be supposed that some trade seemed to be the only calling open to him on account of his blindness.

In the brick-making industry he seems to have been successful, for he was enabled to bring up a family of five in the style that was becoming to a gentleman, and to build eight houses in Belfast as an investment, besides acquiring building ground. He seems to have been of a mechanical turn of mind from childhood, his first invention being a primitive musical instrument constructed by the means of pins stuck into a piece of pine wood, the higher notes being obtained by pressing the pins deeper into the wood.

One of his first juvenile inventions of note was a clock with wheels of wood, the teeth being made of looped wire in the form of staples. He made many model wind and water mills, and later made attempts at perpetual motion, and also constructed a sail which enabled a boat to sail in the teeth of the wind.

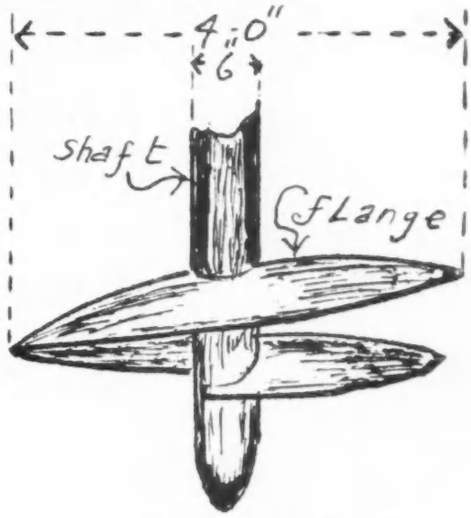
Mitchell also dabbled in aviation, and at one time he claimed that he could invent a pair of wings which would enable a man to fly like a bird, but he later discovered that a bird's pectoral muscles were nine times more powerful than his own; so, on ascertaining this, he finally abandoned the idea.

The storms that swept our coasts during the first of the third decade of the last century caused great mortality among mariners, and the reports of these terrible wrecks which were due in many cases to the lack of lighthouses and other beacons where the erection of same was impossible, due to sandy and mud-bound coast lines, caused Mitchell to ponder and turn his inventive faculties in this direction. The question of founding marine structures on silty foundations had already received Mitchell's attention as a friend, who was engaged in constructing a dock at Belfast, had consulted him regarding this knotty problem.

Having previously experimented with the view of improving wood screws, it occurred to our blind engineer that a screw might be constructed that would screw into mud, sand or silt, the surrounding medium being compressed by the process of screwing would hold the threads if big and wide enough in a rigid manner.

One evening during the year of 1832, accompanied by his son John, a lad of nineteen, he hired a boat at one of the docks in Belfast, and, with John as oarsman, rowed down the Lough and planted a model pile he had made in a submarine bank. This experiment was carried out under the falling shades of night, and no one, except his son, knew anything about it. At a later date he again visited the pile to find that it was where he left it, as steady as a rock, though there had been very rough weather in the interval, and so was born the invention of the screw-pile.

Mitchell patented his pile in 1833. This invention laid the foundation of Mitchell's success as an engineer and secured a fortune of over £40,000 for himself and his descendants. His invention was first put into practice in the construction of a lighthouse on Maplin Sands, on the north side of the Thames, which was erected on a foundation consisting of sand on the top and mud and sand under, being exceedingly soft and penetrable. This lighthouse was erected on nine piles, namely, eight set out in the form of an octogen with the ninth as a centre. The screw-piles used had a shaft of wrought iron six inches in diameter, having the single turn of a flanged screw which measured four feet in diameter; see below—



Extremity of Mitchell's Screw-Pile.

Each pile was screwed with comparative ease to a depth of 22 ft. in the sand, and was calculated to bear a load of sixty-four tons. The nine piles were fixed on nine consecutive days in the summer of 1838, and upon these were fixed nine cambered columns to support the chamber and lantern. Mitchell was a skilled designer and constructor of lighthouses and beacons, and always supervised his work with the greatest care. Often he visited jobs during pretty rough weather; going out in a little boat, he would scramble with great difficulty on to the lighthouse structure and there he would remain all day, perhaps crawling over the staging on his hands and knees and directing the work by his sense of touch.

Hugh Graham, C.E., states that he often visited the lighthouse erected in Carrickfergus Bay by Mitchell in the summer of 1841, he and the blind inventor being very good friends. Graham recalls how he used to watch Mitchell measure the distance between each member of the structure practically by the sense of touch, and how he could with his nimble fingers test the bracing shackles, in one of which he actually discovered a crack which was only visible to a person having normal eyesight when he peered closely at it. Graham adds: "I have been a civil engineer for over thirty years. I have erected structures in India and elsewhere, and I may be said to be a capable man, but it is only after seeing Mitchell supervising his work that I come to the conclusion that this blind man could lead me."

After an allotted span of eighty-eight years, the blind engineer breathed his last one beautiful June day, being in the year 1868. His mortal remains were interred in Clifton Street graveyard, Belfast.

Manchester Ship Canal Company.

The Directors of the Manchester Ship Canal Company declared the following dividends at the Ordinary General Meeting, held on the 25th February, viz.:—

- 3½ per cent. on the Manchester Ship Canal Corporation Preference Stock, same as last year.
- 3½ per cent. on the Preference Shares, as compared with 2 per cent. last year.
- 1¾ per cent. on the Ordinary Shares, as compared with 1 per cent. last year.

£35,000 has been placed to Reserve for Contingencies and Repairs, the same as last year, and £34,824 has been carried forward, compared with £31,608 last year.

Marine Slipways : Unusual Dev

By W. C. GLO

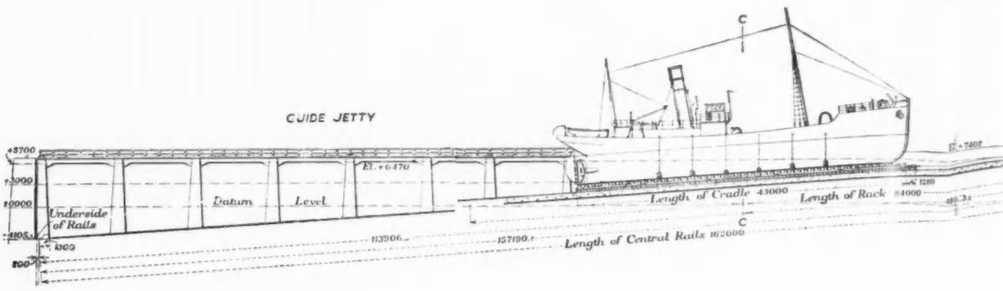


Fig. 3

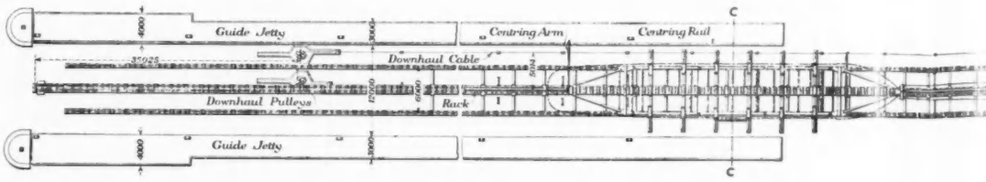


Fig. 4

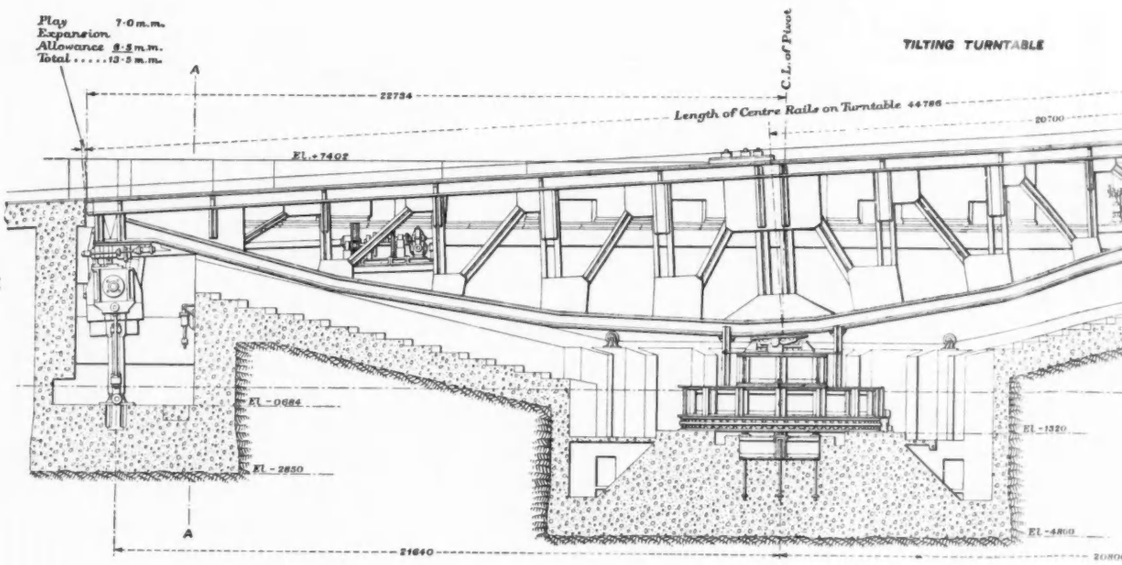


Fig. 5

Figs. 3 to 6

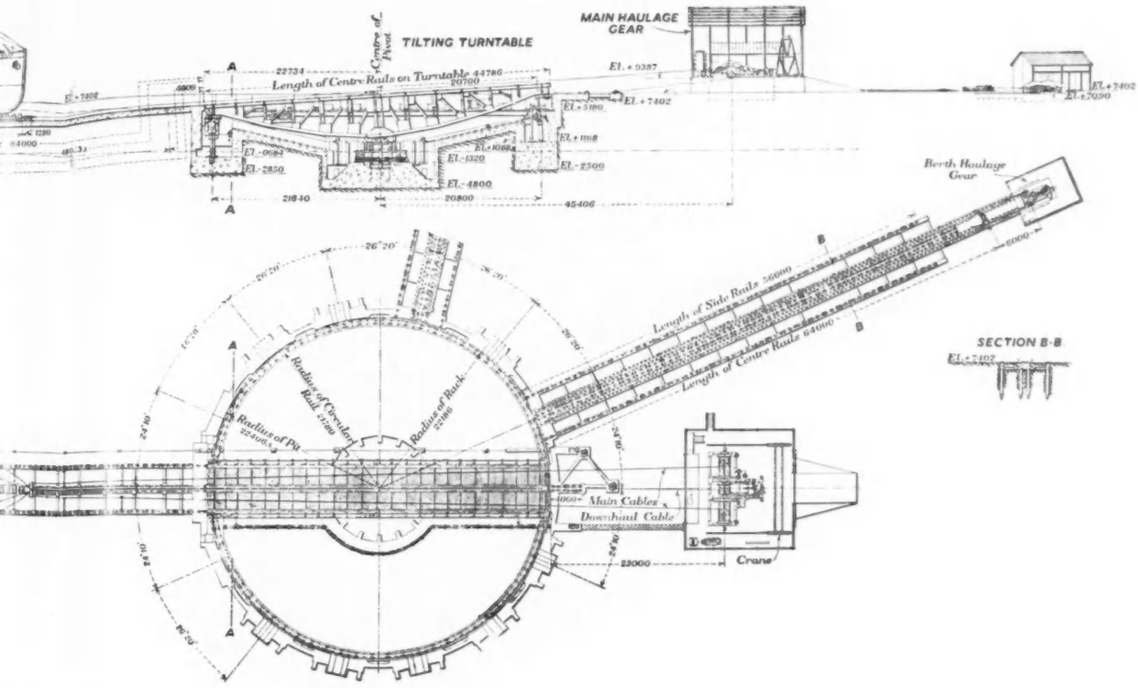
BY his invention of the Patent Slip about 125 years ago Thomas Morton—with whose family the Author is closely connected—brought into effective use an appliance which has proved itself to be not only one of the most efficient but certainly one of the most economical methods whereby the external defects of a vessel may be exposed and the hull repairs carried out. The principles underlying Morton's patent were so sound and practical that they are still adhered to, in the main, in modern slipway construction, and until recent years few, if any, improvements or developments had taken place in spite of the fact that slipways on Morton's principle have been built all over the world. Recent developments in slipway construction have been rendered possible, firstly, by the perfection of the steel wire rope, bringing with it wire rope haulage; secondly, by the application of steam, electric power and the internal-combustion engine to such a system; and thirdly, by the use of steel, particularly modern sections, in the construction of cradles.

As is well known, there are two distinct types of slipway, namely, longitudinal and broadside and, due to the widely varying characteristics of sites and the nature of the subsoil and ground on the foreshore, the problem of deciding upon the most suitable type is sometimes difficult and always interesting. As the frontage in a harbour or waterway is valuable, the longitudinal type is generally admitted to be the most convenient and economical; in fact, it is no exaggeration to state that at least 90 per cent. of the slipways throughout the world are of this type. There are many places, however, where the broadside type has the advantage, such as in a narrow waterway, river or creek, where a longitudinal slipway would seriously interfere with navigation.

Up to about 35 years ago timber (pitch-pine, oak, jarrah or teak, according to climate or country) was exclusively used in cradle construction; in quite a number of modern equipments this practice has been adhered to, the more important of these, with the relative capacities and dates of construction, being given in Table 1. Certain of these are worthy of note: Bombay for its fine teak cradle and heavy single-wire rope haulage gear (wire rope, 13½-in. in circumference); Manila for its 400-ft. oak cradle, in two sections, with the haulage attachment set in

l Developments of an Old System

By *W. G. GLOVER*



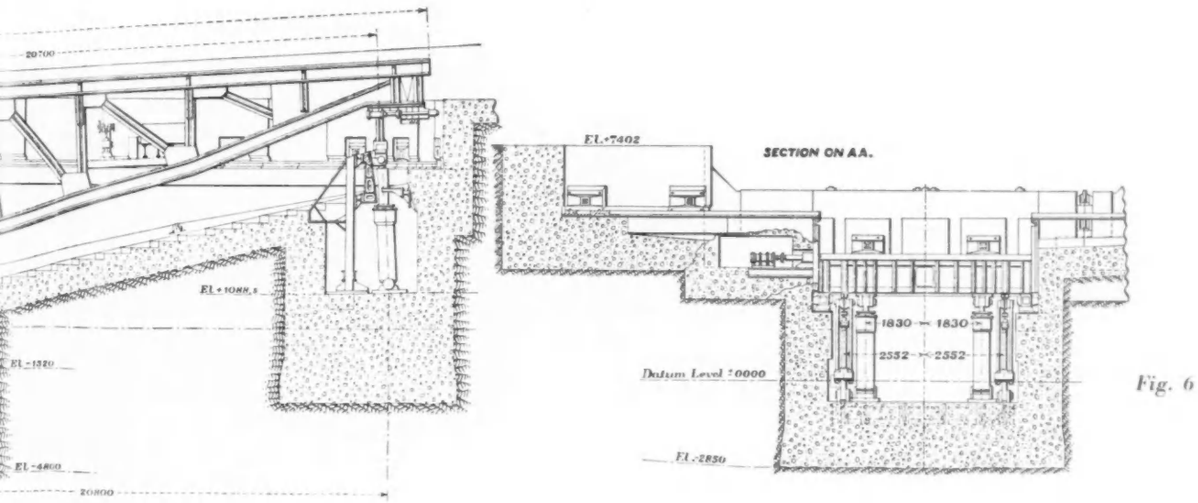


Fig. 6

Figs. 3 to 6

mid-cradle; Grimsby for the last reason and Basrah for its mass of haulage machinery consisting of three double-drum gears, one for each slipway, driven by one steam engine, and for its expanding cradles providing combinations for every type of craft to be handled.

TABLE 1

Location	Material	Capacity tons	Date
Constantinople	Oak	500	1910
Bombay (Mazapon Dock)	Teak	1,600	1911
Manila	Oak	2,000	1911
Port of Para	Oak	3 at 800	1911
Sydney	Oak	800	1911
Basrah	Teak	2 at 500 1 ,, 250	1916/17
Grimsby	Pitch-Pine	2,500	1920

It was thirty years ago that a serious departure from timber was made in heavy slipway construction, when three large slipways, one of 3,000 tons and two each of 2,000 tons capacity, were built by S. & H. Morton & Co., of Leith, for a well-known shipbuilding and engineering concern in Hong Kong. The cradles were of the rigid type, of steel plate and angle construction, the centre section being a tapered box girder with the keel block line rising from forward to aft. The gradient of the heavy cast iron track was 1 in 18, and the haulage gears were on the double-purchase principle and driven by two electric motors each of 225 b.h.p. The wire ropes were notable, being respectively 13½ and 12-in. in circumference. Recently one of these 2,000-ton slipways was replaced by one of 4,000 tons capacity (Fig. 1), which considerably increases the docking facilities of the company. This change presented an interesting problem in wire rope manufacture, necessitating the use of a rope with an actual breaking stress of 760 tons and a maximum circumference of 13½-in. This was accomplished by utilizing special flattened strand construction. In the years following, many large slipways of note were built, but as a

* Paper read at a meeting of The Institution of Engineers and Shipbuilders in Scotland, and reproduced by their kind permission.

Marine Slipways—continued

departure from the usual system, those built for the Suez Canal Co. at Port Said in 1911 were on the live roller principle, which has been almost universally adopted in American slipway construction. While comparatively few equipments above 1,500 tons capacity have been built since 1918, most of them embody some improvement tending to increase flexibility in handling.

Adhering to what may be termed the straight slipway, that is, without side-slipping appliances, and departing from the rigid type of cradle, there are two outstanding methods of rendering an equipment more flexible. These are:

(a) The use of telescopic drawbars operating between sections of the cradle, which reduces the first cost, particularly in under-water foundations.

(b) The setting of the haulage attachment in mid-cradle or in other defined position, thus rendering it possible to deal with vessels of the maximum size or two or more small vessels independently.

Of the slipways in the first category perhaps the best known are those at Basrah, already mentioned, upon which have been successfully handled, particularly during the war period, paddle steamers, stern wheelers, gunboats of the Insect and Fly class, deep sea and river tugs, barges, and even the Persian naval vessel "Mozaffer." Another slipway in this class but of more recent date is at Kilindini, Mombasa; it has a capacity of 2,200 tons. In this case, as at Basrah, the rail length had to be kept to a minimum to avoid interference with navigation. Fig. 2 shows this slipway in course of construction. Intrinsically designed to handle the large coasting vessels "Dumra" and "Dwarka," of the B.I.S.N. Co., the cradle has such variations in its combination of sections that it can deal with all types of craft from lighters and tugs upwards. There are seven sections in the cradle, namely, four 24-ft. 6-in. in length, two forward and two aft, and three 28-ft. 8-in. in length in the intermediate position. Telescopic drawbars of special design are fitted between all the sections in such a manner that, when collapsed, the actual length of the keel block line on the centre way is only 190-ft. These drawbars are designed for expansions of either 5, 10, 15 or 20-ft., thus providing a cradle, under varying combinations of sections, of 190, 230, 250, 270, 280, 290 and 300-ft. Whatever the combinations of sections as fixed by the slip-master, the cradle, when lowered against its stops, will collapse to 190-ft., and the desired expansion will take place as it is hauled up, the weight of each section being sufficient for this purpose. With a short track this ensures ample draught over the forward keel block for the maximum size of vessel. The haulage is of the double-drum type, two-part wire ropes being used with a balance pulley fitted at the fore end of the cradle. The gear is driven by two electric motors each of 125 b.h.p., with contactor control, and fitted with improved downhaul gear. An interesting paper* on the subject of this slipway was read before the Institution of Civil Engineers by Mr. F. C. Fforde on 20th March, 1934.

The most recent application of the principle mentioned in the second category is a slipway of 3,000 tons capacity built for W. S. Bailey & Co., Ltd., Kowloon, Hong Kong. To cope with the exacting requirements of this slipway the cradle had to be of unusual design. It consists of three main sections each 100-ft. in length, with a keel block line rising uniformly from 4-ft. above the rail base forward to 7-ft. aft. The main haulage attachment is set between the two lower sections. Thus the first and second sections are propelled while the third is hauled. The three main sections are sub-divided, as follows:

No. 1 into 3 sub-sections		Nos. 1A, 1B and 1C.
No. 2 „ 2	„	Nos. 2A and 2B.
No. 3 „ 3	„	Nos. 3A, 3B and 3C.

Given eight sections, therefore, and utilizing the various combinations of these, the cradle is capable of dealing with the following:

1. One vessel 200-ft. in length on sections 1 and 2, with the pawls dropped, leaving No. 3 free for a second vessel up to 100-ft.

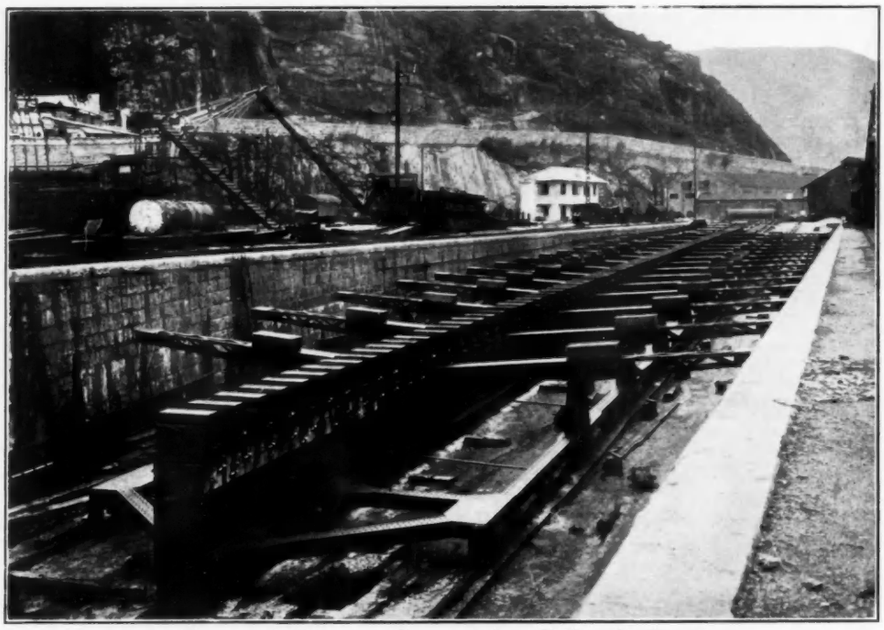


Fig. 1.—4,000-ton cradle erected at Taikoo Dockyard.

2. One vessel 100-ft. in length on section 1, with the pawls dropped, leaving Nos. 2 and 3 available for, alternatively, one vessel of 200-ft. or two, each of from 90 to 100-ft., separately or together.

3. By utilizing various combinations of sub-sections, smaller vessels may be handled, and for this purpose alternative positions of bilge arms are provided on sections 1 and 3.

4. One vessel of 320-ft. up to 3,000 tons displacement on combined sections.

The cradle construction is a little unusual, section 1 being of plate and angle construction, while sections 2 and 3 are of open lattice design, all increasing uniformly in depth from fore to aft. The ease with which sections may be coupled and uncoupled, and the distribution of the load over the rollers, are two noteworthy points in the design of this cradle, the latter being of great importance in a slipway of this capacity. In other respects normal practice has been followed, with the exception of the haulage gear, which is of the double-drum double-purchase type, having four-part wire rope haulage and being driven by two electric motors each of 130 b.h.p., and fitted with geared drum downhaul controlled by a friction clutch.

Of equal importance to the cradle in the safe handling of heavy ships is the main haulage gear. More than 100 years ago, before the general use of steam and electric power and wire ropes for this purpose, the favourite system of haulage for heavy work was that of hydraulic fleeting, a tedious method. Under this system, on each stroke of the ram or rams, a fleeting rod or link was removed from the chain and, as the cradle rested on its pawls, the ram was reversed and connected to the next link. The links were from 16 to 20-ft. in length, with a corresponding stroke of ram. The hydraulic cylinders were therefore of considerable size. The most notable examples of this type of haulage within the Author's memory are Granton, 1,200 tons, longitudinal, and Rangoon, 1,200 tons, and Manila, 1,500, both broadside. Bridging the gap to modern types of haulage are the following:

* "Slipway at the Port of Mombasa." Proc. Inst. C.E., vol. 238.

Marine Slipways—continued

1. The single wire rope haulage system, that is, a direct pull from the drum by a single part of wire rope. Although commonly used in the past for slipways up to, say, 900 tons capacity, there are examples of heavier gears, such as that of 1,600 tons for Mazapon Dock, Bombay.
2. The double-purchase system, in which the rope is anchored at one end, the bight passing round a pulley or sheave attached to the cradle and the other end being wound on a helically-grooved drum. Very powerful gears of this type have been built, notably those for the Hong Kong slipways of the Taikoo Dockyard & Engineering Co., Ltd., which are illustrated in Fig. 1.

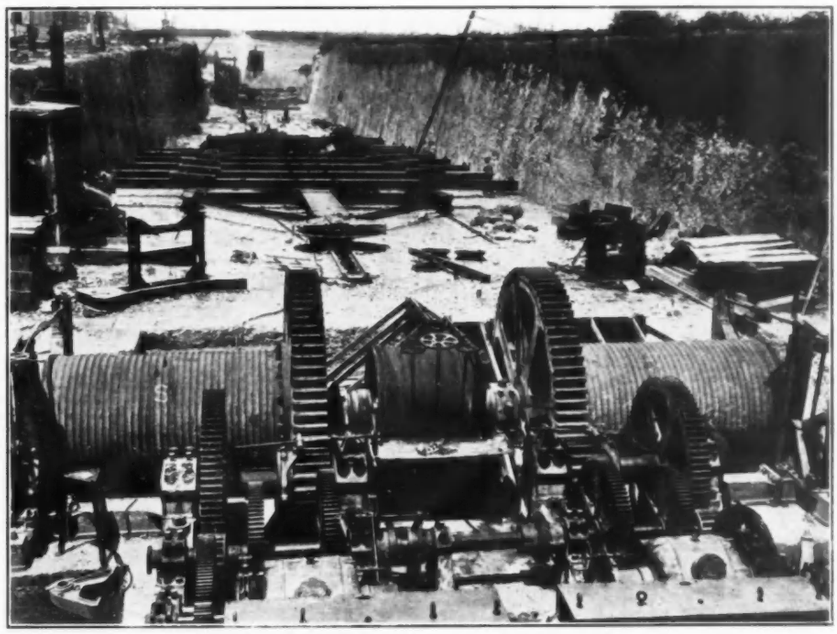


Fig. 2.—Kilindini slipway under construction.

3. The double-drum system, that is, with two-part wire rope haulage, the bight of the rope passing round a balance pulley attached to the cradle and the ends being wound on two drums, right and left helical. In some cases the balance pulley has been replaced by a crosshead, but the former fitting is infinitely preferable as it renders the equipment thoroughly flexible, more particularly if driven by two units. This provides an almost perfect haulage gear, for not only is the pull equalised, but the failure of one of the driving units need not incapacitate the slipway, as the arrangement of gearing is such that either unit can drive either drum, thus providing, in emergency, a double-purchase effect whereby the maximum load may be dealt with at half the normal hauling speed. Fig. 2 illustrates a good example of this type.
4. For excessively heavy work, say, for slipways up to 10,000 tons capacity, a combination of systems 2 and 3 could be resorted to, that is, a system with double-drums and double purchase, thus providing four-part wire rope haulage.

Usually it is necessary to provide a downhaul gear, if only to ensure that the cradle (light) can be hauled down to its lowest extremity in order to obtain the desired draught at the forward keel block. There are various systems of downhaul, but it is important that the system adopted be one by which the downhaul drum will pay out and take in its wire rope precisely at the same speed as that of the main drums, whether launching under brake control or lowering under power.

An unusual type of haulage gear not frequently, if ever, seen in this country was designed for a slipway of 1,000 tons capacity on a gradient of 1 in 12, constructed for Naples in 1912. Purchase blocks of 5/4 sheaves were used, the fall of the rope passing over tandem drums and being accommodated on a reeling drum located behind. Over a mile of wire rope 4½-in. in circumference had to be accommodated. While this type of gear is unusual, that installed at Naples performed its duty efficiently.

The foregoing are generally the principles employed in heavy slipway construction, and reference might now be made to the marine slipway for use with smaller craft, to handle which it is the most economical appliance at present available. In dealing with small craft, it is usually desired to handle more than one vessel at a time, as in a fishing port frequented by a large number of trawlers and drifters up to, say, 1,100 tons displacement. There are many systems available, and there are again two types of slipway at the disposal of the owner, namely, longitudinal and broadside. For the reasons already given, the former is the most generally favoured, and various side-slipping or traversing systems have already been dealt with by Mr. Henderson in his paper*. Of the two systems referred to in that paper, that is, with traversing arrangements above and below the level of the cradle, it is hardly possible to state which is preferable, as both have their advantages and disadvantages, and the suitability of the one or other depends upon the type of craft to be handled and the conditions and nature of the site.

As against the longitudinal system for, say, multiple slipping, there are many places where the broadside principle—which is readily adaptable in a similar manner—is preferable, not only for practical but for economical reasons. The methods of traversing or hauling off, or a combination of the two, are the same. Normally, the main or lower cradle acts as the carrier or transporter, and has mounted thereon a set of rails, laid longitudinally for the accommodation of the cradle proper; these rails register with ground rails laid to right and left of the main track. A series of these berths may be arranged in terraces, if desired, although this is somewhat inconvenient from the point of view of yard efficiency. Vessels are hauled off into these berths, speedily blocked off and the cradle returned to the carrier. A cradle per berth may, of course, be used, but this is rather extravagant. If the nature of the site permits, terraces can be eliminated and the ships accommodated on level ground. This is most interesting and immediately opens a field for the accommodation of a large number of craft. There are two methods of transferring the loaded cradle from the incline to the horizontal. Firstly, by three units consisting of (a) the main or carrier cradle operating only on the incline, (b) the transporter superimposed on the carrier, and (c) the cradle superimposed on the transporter: and secondly, by two units consisting of (a) the transporter operating on both the incline and the horizontal, and (b) the cradle superimposed on the transporter. While the first method is slightly cumbersome although orthodox, the second is unusual, and as it is particularly applicable in dealing with a large number of craft such as barges, it is worthy of some explanation.

The transporter consists of a series of short sections coupled together for dealing with large or small craft in combination or individually. Each section is mounted on two or more pairs of two-wheel bogies, each bogie running on its own rail. Thus for two pairs of bogies there would be four rails, the bogies being, so to speak, staggered. The arrangement of the bogies is such that when on the inclined track, the upper surface and, therefore, the rails of the transporter are horizontal. For the length of the incline, all the ground rails are parallel and uniform

* Trans. I.E.S., 1931-32, p. 226.

Marine Slipways—continued

in both senses, but at the knuckle or the point of transference from the incline to the horizontal, the rails diverge in a vertical plane, that is, those upon which the seaward bogies run are gradually curved to horizontal, while those of the landward bogies are continued ahead for a distance equal to the centres of the bogies and are then curved, resulting in the rails for the seaward bogies assuming a lower level on the horizontal than the landward bogies. The easier the curve, of course, the sweeter the action, but it will be seen that throughout the operation the upper surface of the transporter and, therefore, the rails upon which the cradle and barge rest, will remain horizontal. There are equipments of this nature in existence and they are understood to be very successful for dealing with a large number of barges up to, say, 50 tons in weight. There is one instance where the haulage is done by means of a somewhat elaborate tractor.

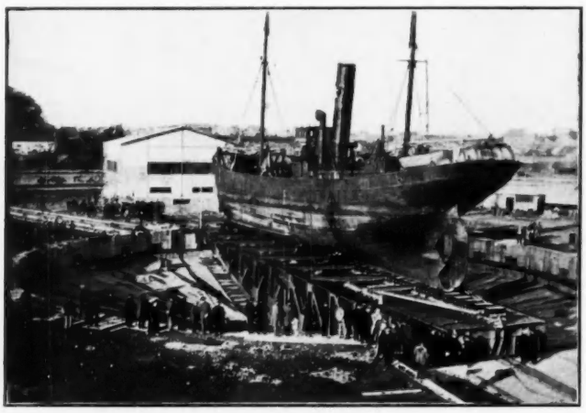


Fig. 7.

This system has proved itself to be invaluable in a problem presented to the Author, which was to transport loaded barges from the lower to the upper reaches of the River Blavet in Brittany, surmounting in the process a dam no less than 168 feet in height. It will be appreciated that it is not good practice to handle loaded craft on an ordinary cradle, particularly if such craft are not very robust. After many proposals, therefore, the authorities concerned are now considering a scheme whereby the loaded barges will be transported afloat over the dam, and this by utilizing a portable dock, in which the barges will remain afloat throughout the whole operation. The following are the actual conditions:

Maximum load, including tank and equipment	tons	365
Lower reach to summit of dam	ft.	757·87
Gradient		1 in 4½
Horizontal portion to summit	ft.	157·48
Upper reach to summit of dam	ft.	239·5
Gradient		1 in 4½
Total travel	ft.	1,154·85
Speed of ascent in either direction ...	ft. per min.	5·58
Speed on horizontal and on descent		16·73
Time occupied for complete cycle	mins.	180
Height of dam	ft.	168·42

This is virtually a broadside slipway upon which it is essential that the load handled, namely, the tank, with its barge afloat therein, be retained in a horizontal trim throughout the entire evolution. The adoption of the principles underlying the system already described enables this to be effectively carried out. The gradients being so steep, normal haulage is dispensed with and rack and pinion traction resorted to, all the tractive machinery, which is electrically driven, being embodied in the tank structure. The tank is mounted on four doubly-articulated bogies, two of which are driven and two idle. Two lines of heavy pin rack are employed, the pressure on the rack teeth being equalised. The electric current is supplied by an overhead trolley system, and numerous safety devices render the operation foolproof. The setting of the bogies and rails is the opposite of that described for the broadside slipway. While there are doubtless other methods of dealing with a broadside movement, there are instances where it has been found not only convenient but essential to carry out the operation longitudinally, and to demonstrate this reference might be made to two interesting equipments designed respectively for the Coast of Guatemala and for Lorient, on the Atlantic coast of France. Articles describing both of these equipments have already appeared in *Engineering*.* The problem of Guatemala was to take charge of 150-ton barges loaded from a ship a quarter of a mile from the shore, place them on a specially designed cradle, haul them ahead, and finally traverse into discharging or loading berths alongside the railway. This was interesting, as not only the usual longitudinal and side-slipping appliances were used, but for the first time a tipping bridge was introduced to effect the transference from the incline to the horizontal.

A more recent and much heavier equipment and designed for a different duty is that at Lorient, which is of considerable importance in modern slipway construction. Figs. 3 and 4 illustrate the general arrangement of this slipway as constructed. The requirements here were to provide accommodation on land for ten ships of the trawler or drifter class up to 650 tons in weight; these were to be dealt with through the medium of one main slipway, with the proviso that any one ship berthed on land could be returned to the water without interference with or movement of any other vessel. The site available proved to be circular and approximately horizontal, on reclaimed ground at an approximate level above datum of 6.00m. (19.68-ft.). It was decided to utilize the horizontal site for the accommodation of the ships, and to bring them to the horizontal plane by some means at that time undecided. All manner of schemes were considered by the authorities, including the broadside principle, but that eventually adopted was based on the longitudinal principle, the conditions as to the number of vessels to be accommodated being fulfilled by the introduction of a tilting turntable or, as it is better described in the French language, "pont basculant et pivotant." The site available made it possible, by utilizing such a device, to make provision for ten berths, ranged round and radiating from the "pont basculant."

La Société du Port de Pêche de Lorient contracted to lay down in the first instance the main slipway and one berth complete with all hauling appliances, the intention being that local ship-repairing concerns should rent one or more berths to be subsequently constructed, putting down the necessary plant alongside to cope with normal repairs. Actually, two berths have been constructed and further additions are anticipated at an early date as the port develops and funds permit. The layout makes provision for the free pivoting and accommodation in the largest berth of vessels up to 180-ft. in length.

The main slipway, consisting of the inclined track, cradle, wire ropes and haulage machinery, has nothing unusual in its design or construction. The rails are of cast iron and are arranged in four lines, with the usual pawl rack between the rails of the centre track. The incline has a gradient of 1 in 16 and is on solid rock and piled foundation up to a level of + 6.00m. (19.68-ft.), at which point the pont basculant abuts. The length of solid track, measured on the middle rails, is 162.00m. (531.5-ft.), which, combined with the length of track of the pont basculant, namely, 44.786m. (146.94-ft.), provides a total length of 206.786m. (678.44-ft.). The cradle is of steel construction, is 43.00m. (141-ft.) in length and built in five sections, with the haulage attachment at the fore end. The haulage is on the two-part wire rope principle, and the gear is of the electrically-driven double-drum type, fitted with special downhaul gear.

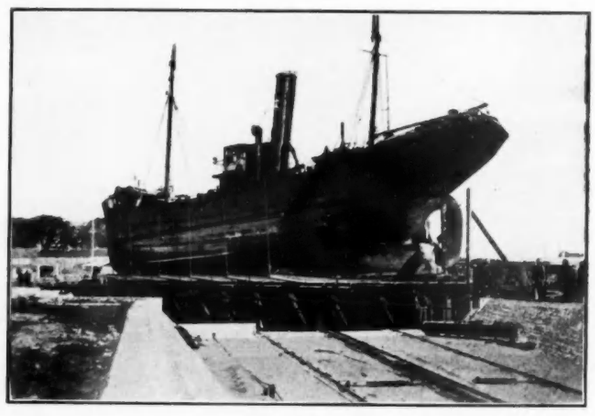


Fig. 8.

The pont basculant et pivotant referred to for short as "the bridge" (Fig. 5) consists of two fish-bellied steel girders 5.563m. (18.25-ft.) in depth at the centre, reduced to 1.397m. (4.58-ft.) at the ends, inter-connected by cross beams and bracing, and designed to cope with the strain imposed by the weight of a vessel of 650 tons plus the cradle, not only while tilting to the horizontal position but also while pivoting. To carry out the tilting or rocking movement of the bridge from

* Engineering, vol. 120, 1925, p. 238, and vol. 135, 1933, pp. 559 & 629.

Marine Slipways—continued

the inclined to the horizontal position, the girders referred to have fitted to their central bases a steel casting formed to engage with a cast steel base controlling the movement in a fore-and-aft direction. This might be described as the knuckle. To provide pivotal movement to the bridge, the lower casting is mounted on a drum girder, having fitted to its base a circular roller path of cast steel. Engaging with this are the pivoting live rollers mounted in a ring and running on a fixed circular roller path of cast steel of heavy section. The diameter of the roller path and of the ring to the centre of the live rollers is 6.00m. (19.68-ft.). The number of live rollers is 48; they are slightly tapered and have a contact length of 343mm. (13.5-in.). The reaction under full load at the pivotal foundation is 1,080 tons, and the foundations were constructed accordingly. The bridge rests in a circular pit of reinforced concrete, the upper wall of which is at the datum level of + 7.402m. (24.28-ft.). Set in the wall of the pit is a circular rail forming the track for a system of peripheral rollers, eight of which are mounted in heavy bronze bearings, at each end of the bridge.

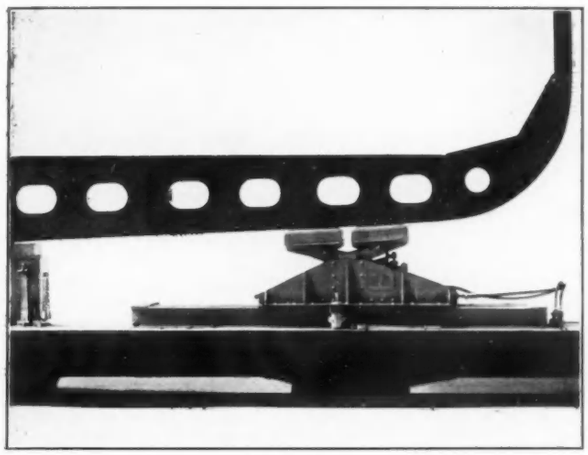


Fig. 9.

The tipping or tilting of the bridge is done by means of three hydraulic rams, two at the seaward end and one at the landward end, each of 120 tons capacity. The ram cylinders are mounted on trunnion bases, thus allowing the ram heads to follow the curve described by the ends of the bridge in tilting. Oil is the fluid used, the pressure of 120 kg. per sq. cm. (1706.8 lb. per sq. in.) being supplied by an electrically-driven pump of 25 h.p. In the operation of tilting, when pressure is applied to one set of cylinders, the fluid is expelled to the cylinder at the opposite end of the bridge, thus providing a cushioning effect and avoiding shock at the end of the movement. For the inclined position, when the rails of the bridge register with those of the main slipway, a gap must be left in the circumferential track. This is provided for by the introduction of a movable beam mounted on the heads of the two seaward rams (Fig. 6) bearing on its upper surface a section of circumferential rail which registers with the rail of the pit when the bridge is tipped to horizontal. The ends of the beam are controlled by guides accurately set to the curve described by the ends of the bridge in tilting, and when in its upper position (bridge horizontal) the beam is locked at each end by hydraulically-operated bolts, which are controlled by the main pump. At each end of the bridge are also fitted two hydraulically-operated locking bolts which engage with recesses provided in the wall of the pit, and lock it in its inclined or any horizontal position, bringing the bridge rails into register with either those of the main slipway or any one berth. The locking pressure of these rams is 8 tons per sq. in., and is supplied by an electrically-driven oil pump mounted on the bridge itself.

To tip the bridge from the inclined to the horizontal position occupies 4 mins. The operation of pivoting is performed by an electrically-driven rotating gear of 15 h.p. mounted on the bridge and driving a forged steel tooth pinion fitted at the seaward end of the bridge and engaging with a special rack mounted at the side of the circumferential rail. The pinion and rack are of special design, the latter being on the Riggenbach principle. There are two pivoting speeds, namely, 3 and 6m. (9.84 and 19.68-ft.) per min. All controls are interlocked in such a manner that no movement can take place until the previous movement has been completed. This applies equally to the main rams, locking rams, rotating gear, and main and berth haulages.

The berth positions radiating from the pit are ten in number, the first two being set at an angle of 24° 10′ each side of the centre line and the remainder at angles of 26° 20′. The length of the berth rails which are, of course, of similar section and centres to those of the bridge and main track, is 209.97-ft., laid horizontally, at a datum level of + 7.402m. (24.28-ft.). A small independent haulage winch is provided for each berth, electrically driven by one motor of 25 b.h.p. These winches are specially designed for hauling the loaded cradle into the berth and returning it to the bridge after repairs. The berth winches are designed on the endless principle, which consists of two parts of combined chain and wire rope, the power being transmitted by two chain wheels on the winch. The pull is equalised by a system of pulleys mounted on a travelling bogie, and the wire rope portion works round that bogie and also round two return pulleys fitted close to the edge of the pit. The bogie which travels on the centre track is provided at its outer end with a set of drawbars for engagement with, and coupling to, those of the main cradle, and is so arranged that it can pass on to the bridge for a sufficient distance for this purpose. The speed of haulage into and out of berths is 3m. (9.84-ft.) per min. at full load and 6m. (19.68-ft.) per min. at light load.

The whole operation of slipping a vessel and of placing her into one or other of the berths is simple in the extreme. Figs. 7 and 8 illustrate stages of the operation. Two convenient jetties and a simple and accurate centring device being provided, no time is lost in blocking the vessel on the cradle, after which the following movements take place, the operations being reversed when returning a vessel to the water:

1. The cradle is hauled up the incline on to the bridge, and brought to rest at the desired position by an electric cut-out.
2. This cut-out permits the operation of the pump on the bridge controlling the locking bolts. These are withdrawn and cut out at the end of the stroke, permitting the main pump to be started.
3. Pressure is applied to the main rams, bringing the bridge to the horizontal and locking the movable beam in the top position.
4. The balance pulley is disconnected from the main cradle and hauled clear of the bridge.
5. The rotating gear is started, and the bridge pivoted to face the desired berth. The automatic cut-out brings the bridge to rest within range of the locking bolts, which are sent home, thus bringing bridge and berth rails into registration.
6. The berth haulage gear takes over and sends forward a bogie for coupling to the main cradle, which is at once hauled into the berth.

As a means of time and labour saving in the preparation of bilge blocks for each docking, a system of mechanically-operated self-aligning and self-adjusting bilge blocks was introduced. Under normal circumstances for a slipway this system would be operated hydraulically, the pressure being obtained not by an external agency, but by an appliance which is self-contained in the cradle. The pressure is produced by the pull exerted by the main wire rope in heaving up, the pressure required only being such as to enable the block pads or bolsters to make contact with the hull, when they will conform to any contour or section whatsoever and remain positively in contact until released. This system which came to light in an endeavour to facilitate the handling of ships on a slipway, and with a view to rendering the operation of blocking a ship on a cradle as nearly foolproof as possible, is equally applicable to a dry-dock or floating dock, particularly of large capacity. Fig. 9 illustrates a scale model of a hydraulically-operated bilge block designed on this system for a graving or floating dock. The support is provided by two or more articulated bolsters mounted on a rocking arm and moved upwards hydraulically into contact with the hull form, to which they accommodate themselves under uniform pressure, the vertical movement being controlled by guides. The rocking arm is mounted on a slipper bearing on the face of a wedge which contains a hydraulic cylinder and piston. The pressure is applied through the piston rod, the end of which, being fixed, permits the wedge to travel horizontally, thus raising the bolsters into contact with the hull. At the butt end of the wedge is mounted a small cylinder operating two pawls which are held in engagement hydraulically with two fine-pitch racks as the wedge advances, and they remain in engagement after contact is made, thus rendering the system positive. In order to reverse the motion and lower a block or blocks, pressure is applied first to the pawl cylinder to lift the pawls prior to the backward movement of the wedge. The pressure of application between bolsters and ship is predetermined, and the whole operation is controlled from the dock wall. Provision is made for positioning each block unit in both a 'thwartship and a longitudinal direction.

Notes from the North

Proposed Fish Dock for Liverpool.

PRELIMINARY plans for proposed accommodation for a fishing industry at the Canning and Salthouse Docks, Liverpool, have been engaging the attention of the Employment Committee of the Liverpool Corporation. The Committee referred the plans to the Land Steward and Surveyor with instructions to submit new plans, with details of a building scheme, together with an estimate of the cost, including that of a cold storage and other ancillary requirements of a fishing port.

To Prevent Flood.

Llandudno Council has under consideration a scheme estimated to cost £11,000 to prevent the flooding of the shoreward part of the town.

Mr. W. T. Ward, the Council's surveyor, has put forward a scheme which comprises a system of groynes on the shore and measures for the prevention of flooding on the promenade. It is proposed to erect a concrete wall at a distance varying from 30 to 35 ft. from the existing sea wall; the space between the two walls is to be paved with concrete and large area grids provided with outlets draining to a surface water manhole discharging on the seaward side of tide valves.

On the landward side of the promenade it is proposed to build an earth bank, with openings at appointed positions for access to the promenade. These openings could be closed by suitable barriers in the case of emergency, and the earth bank would then form a second reservoir and second line of defence.

Grain Storage at Liverpool.

At the 52nd annual meeting of the Liverpool Grain Storage and Transit Co., Ltd., Mr. Edward Paul, who presided, said: "We have at the Alexandra Dock at the north end of the Liverpool Dock system two warehouses—Alexandra No. 1 and No. 2, with a working capacity respectively of 50,000 tons and 25,000 tons. We have again, at the Alexandra Dock, transit silos with a working capacity of 750 tons of grain per hour inwards, and a greater capacity outwards. We have at the Coburg Dock, at the south end of the Liverpool Dock system, the Coburg warehouse with a working capacity of 50,000 tons. We have, during the last few years, installed two pneumatic grain discharging plants of the latest and best design, one at the Alexandra Dock and one at the Coburg Dock. Each of these plants has a working capacity of 500 tons per hour. Finally, for the convenience of our business, we own a fleet of barges with a capacity of 7,000 tons."

Eroder in use at Hoylake.

For many years the Hoyle Lake, Hoylake, has been silting up with sand, and it has become extremely difficult for yachts and fishing boats to enter it except at high water. With the object of re-cutting a channel at the entrance to the lake, the Hoylake Council have supplied an eroder which is similar in construction to one which was used effectively in the Mersey Estuary by the Mersey Docks and Harbour Board. It consists of about 200 yds. of stout steel cable, anchored at each end and supported by buoys. Attached to the cable are numerous iron-shod "legs," which kick about with the action of the tide, with the result that the sand so disturbed is washed away by the receding tide.

Isle of Man Pier Works.

In the Isle of Man Government Accounts, particulars are given of the costs of the Red Pier extensions. It is stated that, theoretically, about £110,000 still needs to be found for the extension of the Red Pier, which is expected to be completed by the summer of next year, 1936.

The estimated cost of the work, as submitted by the Harbour Engineer some years ago, was £262,000. By the end of the fourth year, concluding on March 31st, 1933, £98,624 had been spent. This included the proceeds of a Manx Government loan of £50,000. Since then, a further loan had been raised, partly for this purpose. It is understood that about £25,000 is likely to prove sufficient to meet the costs until the 31st March next. By that time the work will only have about a year-and-a-quarter to run. Construction costs have gone down greatly since Mr. Blaker made his estimate, and estimates are always generous when dealing with work to be done under the sea. The Isle of Man Harbour Board has been asked for a report upon the situation, in preparation for next year's Budget, and, without anticipating their report, it may be expected that the Isle of Man is going to get its Red Pier berths for less than it expected. The average expenditure for the last six years had been about £25,000, and a balance of, say, £40,000 during the next two financial years might possibly be found without creating any fresh public debt.

Bidston Dock.

Mersey Docks and Harbour Board has authorised the letting on lease of two-and-a-half acres of land at the Bidston Dock to Timber and Wood, Ltd., for the handling and storage of pit props, etc.

Bidston Lighthouse.

Birkenhead Corporation has decided to purchase the Bidston Hill Lighthouse and the cottages adjoining from the Mersey Docks and Harbour Board for £1,000. The purchase includes 5,038 acres of land.

New Dock Board Dredger.

The trials have taken place in the River Mersey of the Mersey Docks and Harbour Board's new dredger, "Hoyle." The vessel, which is 330 ft. in length and has a hopper capacity of 70,000 cub. ft., has pumping machinery capable of filling the hoppers with 3,500 tons of sand in fifty minutes, but during her trial she pumped this quantity in forty minutes. The vessel has now been handed over to her owners.

New Sea Wall.

Port St. Mary Commissioners are seeking borrowing powers for the cost of erecting a wall on the seaward margin of a strip of land which the Commissioners have been given by the representatives of the late Mr. Edwin Qualtrough. The wall will start at the end of the breakwater.

The sea wall is to be made in four sections, the first of which is estimated to cost about £900. In each of four winters, fifteen men will be employed for twenty-one weeks. The Government has promised a grant of £675.

Echo-sounding Apparatus.

At one of the meetings of the Mersey Docks and Harbour Board, Lieut.-Col. J. G. B. Beazley mentioned the successful application of the echo-sounding apparatus in locating a submerged wreck in the Mersey.

Recently, the flat "Dulverton" sank off the Canada Dock entrance, he said, and the marine department, to locate the wreck, tried the usual sweeping operations, but without result. They then made an effort to locate her by the echo-sounding apparatus fitted on the board's tender "Vigilant," at a cost of £350. The effort was successful, echo-sounding disclosing an object standing several feet above the bottom of the river bed. A diver was sent down, and at once found the wreck, which was lifted and taken to Tranmere beach.

Personal.

Mr. Sidney Rigg has been appointed assistant goods and dock superintendent for the L.M.S. Railway Company at Fleetwood. Mr. Rigg, a native of North Lancashire, began his career with the old Furness Railway Company, at Barrow, and his experience has included various branches of dock working, both there and in London, where he was transferred in 1924.

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Capt. Robert Parry, chief piermaster at Garston Docks, has retired after 25 years' service with the old L.N.W. Railway Company and the L.M.S. Railway Company. He became master of the Stalbridge Dock in 1909.

* * * *

Mr. W. S. Carson, assistant dock superintendent for the L.M.S. Railway Company at Fleetwood, has been appointed chief commercial assistant to the district goods manager at Manchester. Mr. Carson is a grandson of Mr. Alexander Carson, who was the chairman of the Commissioners when the Fleetwood Dock was opened.

"Penny" Bridge.

At a recent meeting of the Mersey Docks and Harbour Board, the question of freeing from tolls the Poulton Bridge (colloquially known as "the Penny Bridge"), near the Bidston Dock, Birkenhead, was again raised. Mr. Charles McVey asked the chairman of the Works Committee whether, in view of the development at Bidston Dock, where it has been decided to construct a quay, at a cost of £29,369, the time was opportune for a conference between the Wallasey and Birkenhead Corporations and the Dock Board for the purpose of freeing the bridge from tolls. That matter ought to be considered at once. The Chairman of the Works Committee replied that they were at present having a conference with the Birkenhead and Wallasey Corporations on the subject, and hoped that the road would be thrown open and the toll abolished. The present, however, was not the moment for the matter to be brought before the Board.

Notes from the North—continued

Tender Accepted.

Liverpool Corporation Health Committee recommends the acceptance of the tender of Messrs. W. T. Avery, Ltd., 22, Bryom Street, Liverpool, for the supply of a weighbridge with cast-iron girders for erection at the Collingwood Dock, in connection with the disposal of refuse at sea, for £220.

Dock Board Conversion.

Mersey Docks and Harbour Board has successfully arranged for the conversion of £9,800,000 3½ per cent. debenture stock, 1935-65 into 3¼ per cent. debenture stock, 1970-80, at 100. According to the Board of Trade returns, Liverpool is second only to London in the import trade, and is the first port in the kingdom for exports, which are the produce and manufactures of this country and which mainly emanate from the North and the Midlands.

Under the borrowing powers conferred by the Board's various Acts of Parliament, £44,658,286 has been spent on the development of the undertaking to July 1st, 1934, the end of the last financial year. Of that amount, £6,845,728 has been redeemed, leaving an outstanding debt on 1st July, 1934, of £37,812,558. The total revenue of the Board for the last financial year (ended 1st July, 1934) was £3,111,660.

For the current financial year, from 2nd July last until 1st January, the total tonnage entering the port amounted to 10,777,134 tons, and rates and dues on vessels and goods received amounted to £1,129,644, as against 10,344,498 tons and £1,117,229 for the corresponding period of the year ended 1st July, 1934.

The charges at present made by the Board on ships and goods are well below the maxima which they are entitled by Act of Parliament to make, so that the Board has ample powers to adjust those charges to cover their expenditure, including interest on capital.

Dee Conservancy.

In the annual report of the Dee Conservancy Board it is stated that the average condition of the Dee navigation during 1934 with regard to depth was nine inches worse than in 1933, owing to the scarcity of fresh-water flow which continued until nearly the end of the year.

Mr. Walter Conway, accountant to the Board, dealing with the accounts, said that total receipts since the commencement of the Board in 1889 were £44,297, and payments £31,598 15s. 7d., leaving a balance in hand ostensibly on the capital account of about £12,698. That figure, however, when they got down to the balance sheet was really wiped out by the over-expenditure on the income account. On the income account (for 1934), he said, there was an excess of expenditure over income of £900.

Port of Southampton Topics

New Liners make first appearance at Southampton.

FEBRUARY is usually a dull month as far as the shipping industry in Southampton is concerned. This state of affairs is brought about primarily by the fact that the North Atlantic passenger business reaches its lowest ebb during the month, but in recent years the slackness has been accentuated through the absence of so many well-known vessels engaged on cruises.

Six well-known liners are engaged on lengthy pleasure voyages—the "Aquitania," "Homeric," "Empress of Britain," "Empress of Australia," "Asturias," and "Arandora Star"—and not one of them re-appeared at Southampton during February. One or two of them will be back again in March, but there are others in the sextette which will not return until late in April or early in May.

Under normal circumstances five out of the six ships would be sailing from Southampton at least once a month—hence the feeling of slackness during their absence.

In view of the fact that February is normally such a quiet period, it is interesting to mention that six well-known liners made their first visit to Southampton during the month.

The first of the newcomers was the French Line's cabin ship, "Lafayette" (25,178 tons gross), which called in Cowes Roads to embark passengers by tender. She was outward bound from Havre to New York.

For a week or two there was a succession of this Company's ships making their first call at Southampton, for it was only last month that the French Line substituted this port for Plymouth as the embarkation centre for the United Kingdom.

On February 13th the French Line's other super cabin ship, "Champlain" (28,094 tons gross), made her appearance. On February 20th the "Ile de France," which inaugurated the new arrangement, was back again, and then on February 27th Southampton welcomed, for the first time, the popular "Paris" (34,572 tons).

While on the subject of the French Line, it may be mentioned that the "Colombie" made her initial call on February 25th, when she inaugurated the Southampton call as far as the service to the West Indies, Spanish Main, Trinidad and Panama is concerned.

This was quite an event, for Southampton has had no direct and regular connection with the West Indies for close upon a quarter of a century. The break came when the Royal Mail Steam Packet Company decided to discontinue their service to those islands.

Another newcomer was the "Voltaire," which has been assigned by her owners, Messrs. Lamport and Holt, Ltd., to the cruising business. This popular vessel is to undertake a lengthy series of pleasure trips from Southampton this year, whilst her sister-craft, "Vandyck," will carry out a similar mission with Liverpool as her terminal. The "Voltaire" is scheduled to carry out twelve cruises from Southampton. She is a vessel of 13,284 tons gross.

The initial sailing from the port of the Hamburg-America Line's "Cordillera" was of no less interest, for this vessel is forging a local link with the Company's Far Eastern service. She is a vessel of 12,049 tons gross.

The call of the "Cordillera" marked the beginnings of far more important developments as far as the port's Far Eastern connections are concerned, for other vessels will undoubtedly be assigned to operate on the service with her. The new 18,000-ton liner "Potsdam," which is now being completed, was to have taken her place in the Hapag service to the Far East, but now it has been decided that she shall sail in the express service which the North German-Lloyd propose to operate on that route with the new liners "Scharnhorst" and "Gneisenau," which are at present in the course of completion.

This will enable the Company to operate a monthly sailing schedule, and Southampton will figure in the itinerary to be followed. The first sailing will be made by the "Scharnhorst" in May, and later the "Potsdam" and "Gneisenau" will make their appearance.

Docks Statistics for January.

Southampton Docks statistics for January indicate that the year has opened auspiciously for the port. But for the decreases recorded in connection with the cargo handling activities, it would have been possible to record increases, compared with January a year ago, under every heading.

The number of ships entering the port showed a slight advance, for whereas the arrivals in January, 1934, numbered 173 and the departures 174 this January, they were 179 and 178 respectively.

These increases were reflected in the tonnage returns. Inward gross tonnage amounted to 1,086,338 tons, as compared with 975,745 tons, and outward to 1,156,439 tons, as against 1,057,707 tons, giving increases of 110,593 tons inward and of 98,732 tons outward. The net tonnage advances were 82,398 tons inward and 55,108 tons outward. The inward returns were 588,085 tons and the outward 605,464 tons.

The passenger traffic of the port was well maintained, for the arrivals numbered 6,539 and departures 9,464. In January, 1934, the number of travellers who landed was 6,356, and those departing 8,904, so that there was an inward advance of 183 passengers and an outward increase of 560.

The trooping movements during the month were particularly heavy, and 7,488 arrived, as compared with 1,724 in the opening month of 1934. There was also a rise in the total of troops departing, from 2,753 to 4,683.

The cargo decrease, to which reference has been made, amounted to 210 tons inward and 1,716 tons outward. Imports totalled 38,497 tons, as compared with 38,707 a year ago, and exports amounted to 26,291 tons, as against 28,007 tons.

Hull and the East Coast

Revival of Bridge or Tunnel Project at Hull.

INTEREST in the project to improve communication between Hull and the Lincolnshire side of the River Humber by means of a road bridge or, alternatively, a tunnel under the bed of the river, has been revived and the consideration of it by the Ministry of Transport invited. The Barton-on-Humber Urban District Council have passed a resolution instructing the clerk to write to the Minister of Transport, pointing out the desirability of a bridge over, or a tunnel under, the Humber for the purposes of through traffic and the development of this area of the United Kingdom. The Minister is reminded that a Committee of the House of Commons approved a Bill for that purpose a few years ago, and that it was held up by the National finanical crisis, and he is strongly urged to advise the Government to subside such an undertaking out of the money proposed to be devoted to public works of national utility. It may be recalled that when the project was first launched the Government undertook to subscribe 75 per cent. of the estimated cost conditional on the local authorities coming to an agreement and providing the balance. The Barton Council have also adopted a second resolution noting the reported decision of the Government to use public money in the promotion and execution of large schemes of work which would prove to be assets to the whole nation, and assist the mobility of transport and urging the Hull Corporation to reconsider the bridge (or tunnel) scheme, and to "take steps immediately for the promotion of this project, as it is reasonably obvious that this eastern area of England cannot properly be developed under existing conditions."

Increase in Road Transport at Hull Docks.

The extent to which road transport has encroached on railway traffic is shown by the fact that during a two-days' strike of timber carriers at Hull upwards of 200 motor lorries had congregated at the Hull docks and timber importers' yards from all parts of Yorkshire and the North of England and the Midlands. The railway authorities are also turning more and more to road transport for the inland delivery of goods from the docks. A great deal of traffic, which formerly was transhipped at Hull for neighbouring towns and villages, is now intercepted there and delivered direct by motor lorry services, in many cases saving a day in transit. At Hull the London and North-Eastern Railway have over sixty motor vehicles ranging from ordinary two-ton lorries to six-ton mechanical horses.

Dredging of Scarborough Harbour.

At a meeting of the Finance Committee of the Scarborough Corporation, a letter was received from the Harbour Commissioners with regard to a scheme for dredging Scarborough Harbour at an estimated cost of £3,500 to £4,000. Consideration of the matter was, however, deferred to a future meeting.

Ideal Shed Lay-out at Goole.

The latest new shed to be constructed at Goole by the London, Midland and Scottish Railway is pointed to as something new in modern dock practice and lay-out. The lay-out of this particular shed and its adjoining quay affords an example of what can be done by intelligent fore-thought. The cranes operate in such a manner that every possible form of discharge can be catered for. In the first instance, the quayside cranes span lines of way immediately alongside the dock wall, thus enabling bulk cargoes that can be "cleared" through Customs without delay to be loaded direct on to wagon. Other bulk cargoes, such as semi-products of iron and steel, are deposited on the quay in the position in which they remain until required for despatch by rail, the same simple type of lift that discharged the various traffics in their temporary storage positions being again available for transport to truck. Beyond this storage ground, but still within the span of the discharging cranes, runs the front line of the shed doors.

Every yard of the front of the shed, which is approximately 360 yards in length, is served by roller shutters, which prevent entirely the congestion caused by the ordinary door admission to transit sheds. Inside, and running the full length of the shed, is a series of travelling cranes having an overall span, not merely of the storage area in the shed but also of the railway wagon lines which run through, and enable a complete "cover" of the total area to be made. The lay-out in this case affords absolute justification for conceding a wider space between ship and shed and for covering this space by the span of the discharging cranes, thus avoiding useless trucking. In other directions the older form of shed in use at some of the quays at Goole has proved itself of great value, due to the operation of traffic consequent upon Customs examination and bonding. While many ports have been in difficulties from this angle Goole, we are pleased to know, on the authority of Mr. Edward G. Garstang, Steamship Manager L.M.S. Railway, has maintained a steady flow of business with which even the novelty of many of the duties and the work entailed has not seriously interefered.

Meeting of Bridlington Harbour Commissioners.

At the quarterly meeting of the Bridlington (East Yorkshire) Harbour Commissioners, presided over by Dr. T. C. Jackson, it was reported that the dredger, recently purchased, had in ten weeks removed 9,765 tons of material from the harbour. Mr. S. Charlesworth, Chairman of the Works Committee, said that there had been continuous working, with the exception of Christmas week, and that on the whole, minor set-backs notwithstanding, the dredger was giving satisfaction. Councillor Newby expressed the opinion that if the Commissioners could average 10,000 tons during the winter they could consider they were proceeding quite satisfactorily. It was stated that had the Commissioners engaged an outside firm to do the work it could not have been done at less than half-a-crown per ton, and that when the Harbour was cleared by hand in 1884-5 the cost was 1s. 3d. per ton, and wages were much less than to-day.

Councillor Newby remarked that in order to move 10,000 tons of mud at 2s. 6d. per ton it would have cost the Commissioners £1,250, and that in view of their payments they were doing the work at much smaller cost than if they had had to engage others to do it. He was quite satisfied with the dredger, although they had to acknowledge that they would be faced with the necessary repairs. They could not expect it to be as good as new. If they could get five or ten years' service out of it they would be well repaid.

On the motion of Mr. Gray, it was decided to fix the Common Seal of the Commissioners to the mortgage in respect of the borrowing of £1,500 from the bank required for the purchase of the dredger. The Commissioners considered in private a report of an interview with representatives of the Royal Air Force in connection with a proposed grant towards the cost and maintenance of the dredger and the question of increased accommodation for the R.A.F. Another matter the Commissioners had before them was an application for the use of certain of their property near the harbour for amusement purposes.

Hartlepools Dues Reduced.

The Hartlepools Port and Harbour Commission, at the beginning of February, decided to reduce their tolls and dues by a further 5 per cent. from March 1st, making a total rebate of 25 per cent. below statutory rate. The financial statement showed a surplus on the year's workings of £5,302, against £4,174 in 1933. Imports of timber and exports of coal on which tolls had been levied showed an increase of 101,435 loads, and 154,379 tons, respectively, during the year when compared with 1933.

The Port of Copenhagen.

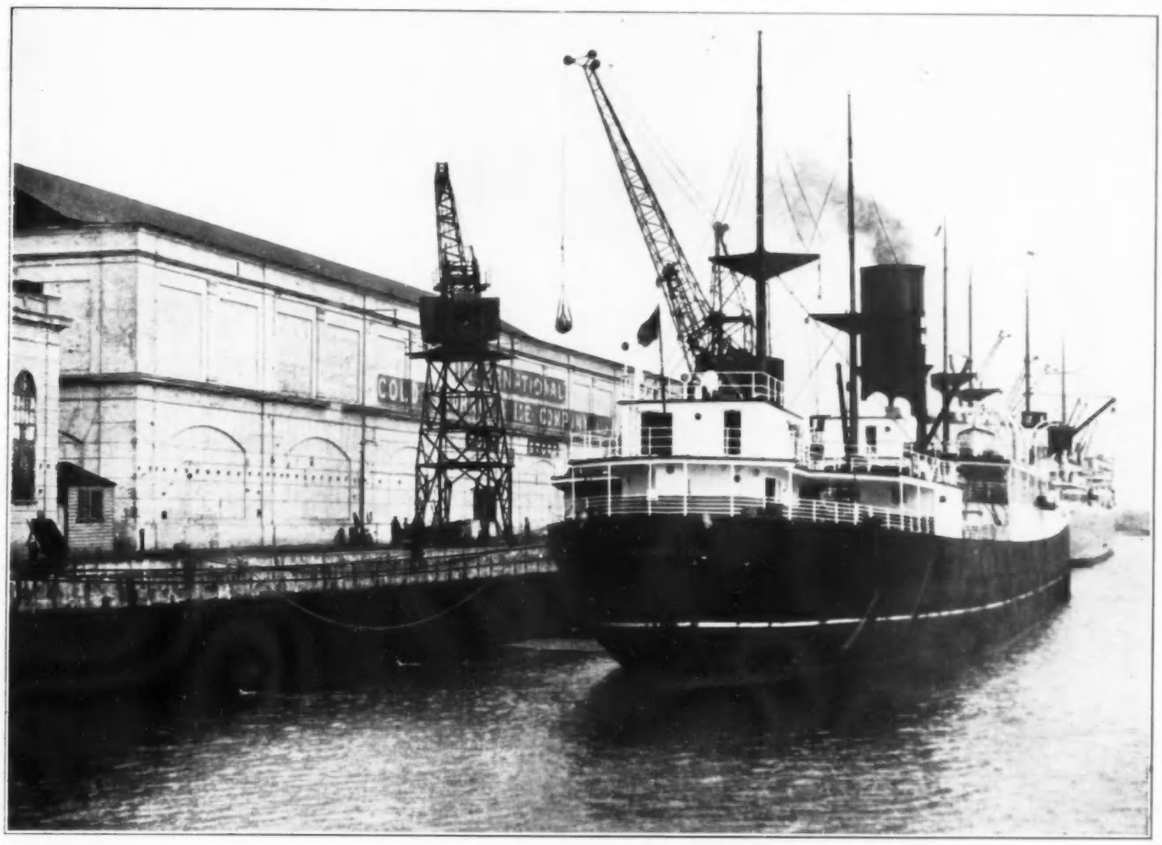
The number of ships which entered the Port of Copenhagen during January, 1935, was as follows:—From inland ports 960 steam and motor ships arrived of 175,266 n.r.t., and 14 sailing vessels arrived of 2,757 n.r.t. The shipping arriving from foreign ports comprised 620 steam and motor ships of 353,088 n.r.t., and seven sailing vessels of 362 n.r.t. The total of steam and motor ships and sailing vessels arriving from both inland and foreign ports amounted to 1,601 vessels of 531,473 n.r.t.

The statistics for the year 1934 are now available, and show that 24,691 vessels arrived at the Port of Copenhagen with a net registered tonnage of 7,065,567. This total was made up as follows:—Shipping arriving from inland ports, 14,934 steam and motor ships of 2,154,316 n.r.t., and 136 sailing vessels of 27,732 n.r.t. From foreign ports, 9,377 steam and motor ships arrived of 4,818,831 n.r.t., and 244 sailing vessels of 64,688 n.r.t. The total of steam and motor vessels arriving from both inland and foreign ports was therefore 24,311 vessels of 6,973,147 n.r.t., and 380 sailing vessels of 92,420 n.r.t.

The number of vessels that arrived for bunkering, etc., and not included in the above figures, was 1,204 steam and motor ships of 691,297 n.r.t., and seven sailing vessels of 2,537 n.r.t.

Imports and exports during the nine months ending September, 1934, show an increase over the figures for the corresponding period of 1933. For the first nine months of 1934 imports amounted to 3,401,890 tons, as compared with 3,101,755 tons for the corresponding period of 1933. Exports for the first nine months of 1934 amounted to 910,123 tons, as compared with 861,521 tons for the corresponding period of 1933.

Southampton Docks



The "Westmoreland" discharging Meat into Cold Storage.

THE remarkable growth of Southampton Docks is a striking tribute to the efficient and progressive standard of the undertaking, particularly when it is realised that less than 100 years ago the docks were non-existent at the Port. It was in 1836 that the Southampton Dock Company was incorporated by Act of Parliament, and in 1843 that the first dock was opened for traffic. Since the latter date extensions and additions have been continually increasing the area and importance of the docks so that to-day Southampton is Britain's Premier Passenger Port, the third Port of the United Kingdom, judged in terms of the quantity of shipping tonnage entering annually, and fourth Port in respect of the value of import and export trade dealt with.

By successive stages the docks have grown until they now comprise four wet docks and seven dry docks in addition to extensive deep-water river quays along the Rivers Itchen and Test. The wet docks and the dates of their opening are as follows:—The Outer Dock, of 16 acres, 1843; the Inner Dock, of 10 acres (the only closed basin on the Estate), 1851; The Empress Dock, of 18½ acres, 1890; and the Ocean Dock, of 15½ acres, 1912.

Owing to the inability of the original Dock Company to provide the necessary facilities to cope adequately with the ever-increasing trade, the docks were purchased, in 1892, by the London and South-Western Railway Company, who were in a position to extend the undertaking more fully, and the Company—now Southern Railway Company—have justified their action by embarking on ambitious schemes of enlargement, the latest of which has dwarfed all previous efforts in an attempt to make Southampton the supreme commercial seaport.

Primarily, natural advantages have lent particular emphasis to the development of the Port, and the harnessing of these gifts of nature has been the means of providing a safe port of entry for the largest liners engaged in the Mercantile Marine.

Access to the docks is by means of an incomparable estuary about six miles long and one mile wide, with a depth of water about 35 ft. at L.W.O.S.T. Another feature that is unique amongst British Ports, and is, moreover, a great boon to shipping, is the possession of double tides daily, whereby the period of high water is extended by about two hours.

The Port's position in relation to London, which is only 78 miles distant, and its proximity to the principal European centres, are other factors that have aided the flow of trade through the Port, and have materially assisted Southampton in its speedy climb to eminence as a British port.

The great depth of water available at the open docks and quays of Southampton has been a factor of paramount importance in attracting a huge volume of shipping to the Port. Another factor favourable to the Port is the small range of tides—13 ft. on Springs and 8 ft. on Neaps—which greatly facilitates the handling of shipping traffic. During recent years, the approaches to the docks have been greatly improved, and this has strengthened Southampton's claim to be the only great British port where the largest ships may enter or leave at any state of the tide.

The 17,000,000 tons of shipping which now enters the docks annually is more than double the tonnage accommodated in the early post-war years, while both import and export trades, although adversely affected by the severe depression experienced during the past few years, have advanced substantially since 1921, and aggregate nearly one million tons per annum.

Southampton has an extensive and varied foreign trade, its regular ocean steamship connections with all parts of the world, including mail and passenger services, which provide the speediest sea transport routes to and from Britain. It is also second to London only among British ports in respect of the value and importance of transhipment trade.

So far as the development of the freight traffic at the docks has been concerned, a number of factors have influenced this important phase of shipping activities. Its growth has been fostered by the southward movement of industry and population in England, the increasing importance of Southampton as an outport of London—it is within three hours' express freight-train service of Metropolitan markets—and the accession to the port of a large number of new shipping companies. The marked increase of population within the last decade in England has given the Port an effective hinterland which boasts 16,000,000 inhabitants within 100 miles' radius.

The most striking development in the cargo trade at the docks during recent years has been that manifested in the fruit and perishable traffic. Enormous quantities of fruit, forming quite one-third of the total imports, are now received at all periods of the year, and from every clime. To furnish an idea of the dimensions of specific fruit traffics handled, it may be mentioned that 3,500,000 packages of South African deciduous fruits were dealt with last season, as well as 1,500,000 boxes of citrus fruit from the same source. Messrs.

Southampton Docks

Grain for J. Rank, Ltd.'s New Flour Mills being discharged from "Temeraire" by Pneumatic Discharging Plant.

Cargo of South African Fruit in No. 101 Shed at the New Docks Extensions.

Southampton Docks—continued

Elders and Fyffes' banana traffic from the West Indies and Central America, which is comparatively new to the Port, amounted to 1,500,000 bunches in 1933, compared with 900,000 bunches in the previous year.

Imports of meat and produce from Empire sources, particularly South Africa, New Zealand, and Australia, have increased, as have the quantities of fruit and vegetables received from the Channel Islands.

Other commodities in which substantial progress has been made are wool and timber imports, the increase in the last-named traffic being due, no doubt, to the extensive building operations in the South of England.

Apart from its overseas connections, Southampton has a very large cross-Channel traffic, the services of the Southern Railway Company providing almost daily communication with French Ports and the Channel Islands, whilst other shipping companies link up Germany, Holland, and Belgium with the Port.

In regard to the Port's passenger traffic activities, it may be mentioned that the total number embarking and disembarking, both ocean and cross-Channel, has increased 40 per cent. since 1921, whilst Southampton has acquired 35 per cent. of the United Kingdom's ocean passenger traffic—a percentage far in excess of that claimed by any other port. Constructed along the many deep-water quays are modern single and double storied transit sheds, into which special trains run on the days of arrival and departure of liners, thus obviating much inconvenience to which the ocean voyager would be exposed if such facility was non-existent.

Every convenience in the way of equipment is provided at the quays, sheds, etc., to expedite working and the needs of special classes of traffic, such as fruit, meat, wool, timber, grain, are particularly catered for. Up-to-date types of electrically-operated level-luffing cranes are extensively employed for quayside working in conjunction with electric trucks of 2-tons standard capacity, the latter being utilised for the transport of freight between quay and shed, etc. There is also a system of hydraulic cranes, providing with the electrically-operated types a complete range of quayside lifting appliances from one to fifty tons. A further supplement to this equipment is provided by a 150-ton floating crane, utilised for exceptionally heavy lifts.

Dry-docking accommodation must of necessity form part of the equipment of an up-to-date port, and in this respect the Southern Railway Company have made ample provision at Southampton Docks. Six graving docks, ranging from 280 ft. to 912 ft. in length, are available, in addition to which there was completed, in 1933, the largest graving dock in the world —the "King George V. Dock"—having an overall length of 1,200 ft., and a width of entrance of 135 ft. Thus there is provided at Southampton Docks dry-docking accommodation for the largest as well as the smallest vessels afloat.

The total lineal quayage on the Estate—including 7,000 ft. recently completed in connection with the Docks Extension Scheme—is 28,214 ft.

A factor of inestimable value to the trade of this Port is the linking up by rail of all quays and sheds with the main-line system of the Southern Railway. Forty-five miles of railway exist on the Estate, which effect direct communication with every town and market in Great Britain.

In addition to the facilities mentioned, the value of the docks to the commercial world is further enhanced by the existence of excellent Cold Storage accommodation. This is provided on the Test Quays, alongside which vessels may berth and lie afloat at all states of the tide. The premises in question are the property of the International Cold Storage and Ice Company, Ltd., and have a storage capacity of 1,700,000 cub. ft.

Now nearing completion, the Southern Railway Company's huge Dock Extension Scheme, commenced in 1927, has added a thoroughly modern self-contained Docks Estate to the accommodation already described.

S.S. "Majestic" in King George V. Graving Dock. World's present largest liner in world's largest graving dock.

The site of this scheme was a bay on the River Test (to westward of the original Docks Estate), about two miles long and half-a-mile wide, and extending from the Royal Pier up-stream to Millbrook Point. It consisted of a mud-land, covered at high tide, but bare at low tide. The scheme included the construction of a quay wall, about 1½ miles long, and running about East to West, and on the South side of the wall the dredging of a deep-water channel and berths for eight big ships in line, and on the North side of the wall the reclamation and raising of about 300 acres of the mud-land. The reclaimed area is being planned not only for such dock accessories as quay space, sheds, warehouses, roads and rail sidings, but also for the establishment of factories and depots which naturally grow up round a deep-water dock.

The new extensions include 7,000 ft. of deep-water quay wall, designed for an ultimate depth of water of 45 ft. at L.W.O.S.T. Facing this quay wall, which has now been completed, will be

DOCKS AND QUAYS: DIMENSIONS.

Dock or Quays	Area	Average Depth L.W.O.S.T.	Length of Quays.	Width of Entrance
Ocean Dock	15¾ Acres	40 ft.	3,807 ft.	400 ft.
Empress Dock	18¾ Acres	26 ft.	3,500 ft.	165 ft.
Outer Dock	16 Acres	18 ft.	2,621 ft.	150 ft.
Inner Dock	10 Acres	Open at High Tide only	2,575 ft.	—
Itchen Quays	—	28 ft.	4,067 ft.	—
South Quays	—	30 ft.	425 ft.	—
Test Quays	—	32 ft.	4,219 ft.	—
Docks Extension	—	40-45 ft.	7,000 ft.	—

DRY DOCKS: DIMENSIONS.

	No. 1	No. 2	No. 3	No. 4	No. 5 Prince of Wales Dock	No. 6 Trafalgar Dock	No. 7 King George V. Dock
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Length Overall	401 0	281 0	523 0	479 0	745 0	912 3	1,200 0
Length at Floor Level	378 0	240 0	501 0	451 0	729 0	852 0	1,141 6
Width at Entrance	66 0	51 0	80 0	56 0	91 0	100 0	135 0
Depth of water over Blocks at H.W.O. Spring Tides	19 3	14 0	24 2	22 9	32 6	35 ft. over cill	50 ft. 6 in. over cill
Depth of water over Blocks at H.W.O. Neap Tides	15 9	10 6	20 8	19 3	29 0	31 ft. 6 in. over cill	47 ft. over cill

Southampton Docks—continued

The "Majestic" in the King George V. Graving Dock, on January 19th, 1934.

eight magnificent passenger and cargo sheds. Four of these have already been erected, and the second four are at present under construction.

It is at the extreme West end of the docks extensions that the "King George V. Dock"—previously referred to as the largest dry-dock in the world—has been constructed. This dock was built primarily to house the new 73,000-ton Cunard White Star liner, but its dimensions are sufficient to accommodate vessels up to 100,000 tons, or more, if ships of such size should ever be brought into commissoin. It contains 260,000 tons of water, which can be ejected in four hours by four large centrifugal pumps. The dock, which was built in the record time of 2½ years, was opened by their Majesties the King and Queen on July 26th, 1933. The R.M.S. "Majestic," at present the world's largest liner in commission, was successfully dry-docked there on January 19th, 1934.

It will be obvious, from the details recited above, that the Southern Railway Company, as dock owners, are pursuing, in no uncertain manner, a highly commendable policy of commercial enterprise, calculated adequately to supplement the great natural advantages of Southampton, and to place it in the forefront of the world's seaports.

Port of Nantes

The following table shows the imports and exports at the Port of Nantes for the year 1934, as compared with the year 1933:—

	IMPORTS		EXPORTS	
	1934 Tons	1933 Tons	1934 Tons	1933 Tons
Asphalte and Tar	18,530	19,314	950	163
Bananas	21,286	22,646	—	—
Building Materials	40,965	34,561	38,933	47,427
Cereals	24,445	33,924	26,966	4,767
Coal	883,979	865,108	34,288	42,327
Coke	—	—	850	—
Essence (for motor cars) ...	75,337	59,006	1,749	951
Iron and Steel	14,566	17,498	6,234	5,406
Kaolin	2,034	3,328	—	—
Nitrates	17,531	8,262	—	—
Oilcakes	880	800	—	—
Oilseeds (Ground Nuts, etc.) ...	3,499	4,394	—	180
Ore	1,583	—	160,825	126,570
Petroleum	5,848	6,917	—	—
Phosphates	136,755	139,886	10,035	692
Pitch	25,497	19,638	—	—
Pyrites	47,866	36,218	31,650	28,931
Rice	65,217	54,165	40	—
Salt	4,459	2,139	650	—
Sugar	45,281	48,498	3,726	4,723
Various	72,569	82,204	78,794	90,258
Wine and Rum	92,089	109,487	7,832	11,014
Wood (from Scandinavia) ...	15,512	13,924	53	400
Wood (from Colonies) ...	7,943	4,424	148	163
Woodpulp and Paper ...	6,197	11,821	—	—
Totals ...	1,629,868	1,598,162	403,423	364,472

Port of Wellington, New Zealand: Statistics for 1934.

From statistics just available, it can be seen that the traffic in the Port of Wellington showed for the year ending September 30th, 1934, an increase over that of the previous year, when it was lower than it had been for a considerable period. Whilst the total tonnage of vessels entering the port was little higher than in the 1932-33 year, and increased only from 3,652,764 n.r.t. to 3,653,110 n.r.t., the tonnage of all classes of cargo handled inwards and outwards and transhipped showed over the above periods an increase of 159,700 tons, or 12.4 per cent., rising from 1,292,576 tons to 1,452,276 tons. The manifest tonnage, which included transhipments outwards as well as inwards, was 1,640,774 tons, an increase of 11.8 per cent., or 172,582 tons over the previous year.

Robert Boby, Ltd., Bury St. Edmunds.

Two very interesting pamphlets have just been issued by Messrs. Robert Boby, Ltd., of Bury St. Edmunds, Suffolk. One of these pamphlets, known as Leaflet SGC. 201, describes some of the recent installations which have been carried out by this firm for the purpose of dealing with various methods of treating and handling grain, seeds and cereals. This leaflet also gives illustrations of some of the plant supplied.

The other pamphlet is known as Brochure P.L., and gives a very full description together with illustrations of the pneumatic grain discharging plant which was recently installed at the Imperial Dock, Leith, by Messrs. Robert Boby, Ltd.

If any of our readers are desirous of obtaining copies of these pamphlets they can do so by application to Messrs. Robert Boby, Ltd., and mentioning this journal.

Sea Loading Berths for Oil Tankers

Modern Methods of Loading Crude Oil by means of Submarine Pipe-lines

By R. B. YELD, late Assistant Marine Superintendent, Iraq Petroleum Company, Ltd.

THE great engineering achievement which has brought the crude oil resources of the inland oil-fields of Iraq to the shores of the Mediterranean Sea, has been the means of almost a transformation in the methods of loading oil-tank vessels.

At the hitherto insignificant harbours of Haifa and Tripoli, terminal stations for storage of the crude oil, pumping installations, and submarine pipe-lines leading to mooring berths a mile from the shore, have sprung up.

Both sea-loading terminals at these two ports are equipped to load an average of seventeen 10,000-ton tankers each month, at the rate of four million tons of oil per annum.

Loading of oil takes place at the rate of a thousand tons of oil per hour and a tank ship having a capacity of ten thousand tons of oil, will berth, load and clear in an average of eighteen hours.

Mooring launches in Tripoli Harbour.

View showing how the flexible hose is brought on board a tank vessel.

There are three loading berths at Tripoli and two at Haifa. Four large mooring buoys are allotted to each berth, the buoys being each secured to two anchors weighing five tons each by adequate scope of heavy chain. The mooring buoys are so arranged as to enable a ship to moor facing the prevailing conditions of wind and tide. The position of the buoys is determined by the depth of water available and by the configuration of the coast. The presence of headlands, shoals and islands has frequently a marked effect on the set of the true tidal stream, and moorings are therefore laid in position only after an exhaustive study of local meteorological records, an examination of the coast-line and even of the sea bed. This last takes the form of submarine surveys, which are undertaken by divers. By the results of these preliminaries, the buoys are enabled to be placed so as to allow of a vessel lying at the moorings with her head pointing in one of several directions, which have been found as best suited to the locality.

In taking up a berth, a ship moors with her own anchors out ahead and stern lines to the buoys. She is met on arrival by a mooring master and piloted to the berth assigned to her. Sea-going motor launches are necessary for this service, since the ship must be boarded by the mooring master some distance out to sea on an exposed coast. These launches are also used to tow the ship's hawsers to the buoys, to which they are secured by the launch crews. An operation which, in rough weather, calls for considerable skill.

The submarine lines consist of extra heavy 12-in. diameter steel pipe, welded together in joints of about 40-ft. lengths. Electrical welding is employed, which is done on shore before the lines are laid to sea.

The Haifa Loading Berths.

Loading of tankers at Haifa takes place at two loading berths, at both of which there is a depth of water of 32 ft. at mean tide.

A single 12-in. pipe-line to each berth is reduced at the seaward end of the line by means of a Y to take two 8-in. flexible hose pipes.

The 12-in. pipe-lines are laid on the sea bottom at right angles to the shore, and the berths are 2,600 ft. apart. The ends of the lines being 4,212 and 4,201 ft. respectively from the shore. The flexible hose is buoyed so that it may be

Haifa Harbour. One of the 5-ton anchors secured to a barge before being placed in position at the sea loading berths.

Sea Loading Berths for Oil Tankers—continued

picked up by the tanker and, having been brought on board by means of the ship's tackle, connection is made to the vessel's tanks and the loading of oil is ready to begin.

Type of mooring buoys in use. Weight 2 tons each. (Photo taken in Haifa Harbour).

The loading operations are controlled by a signal station on shore, situated between the two pipe-lines. The signal station is equipped with an electrically-operated visible signal-panel system of communication with a pump-house. In the pump-house Worthington-Simpson centrifugal pumps operated by Laurence Scott electric motors of 500 h.p. are installed, and are capable of pumping the oil at the rate of 1,000 tons an hour.

Between the signal station and the ship, communication is maintained by flag hoist, using the international code of signals; by submarine telephone; by Morse blinker and by siren.

The Tripoli Loading Berths.

The system of operation at Tripoli is on similar lines to those already outlined, except that gravity loading is employed. The rate of loading obtained by gravity from tanks, which are erected at a height of 220 ft. above sea level, is again 1,000 tons per hour. Transfer of oil from tanks situated at a lower level is, when necessary, carried out by a Worthington-Simpson centrifugal pump, driven by a Laurence Scott electric motor of 185 h.p.

There are three sea-loading berths at Tripoli, all 2,600 ft. apart, and at each of these moorings there is an average depth of 50 ft. of water. There are two 12-in. diameter pipe-lines to a berth, which are reduced at the ends to connect with 10-in. flexible hose, one hose to each pipe-line, the difference of method being due to the adoption of gravity loading. The lengths of the Tripoli sea-lines are respectively: 4,420, 4,400 and 5,470 ft. from the shore to the loading berths, and the lines are laid fan-wise.

Traffic at the Harbours of Narva and Reval, Esthonia, during 1934.

An exceptional degree of activity has been maintained during the year 1934 in the harbour of Narva, owing largely to an improvement in wood exports. The harbour tolls amounted to no less than 260,000 Kroner, which is claimed to constitute the extraordinary increase of a hundred per cent. over the 1933 figure. Exports totalled some 52,000 tons, and imports 50,000 tons.

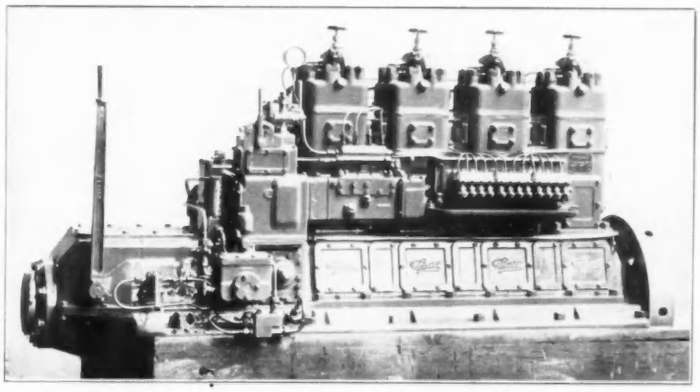
In the year 1934, 3,380 ships with 943,839 n.r.t. visited the harbour of Reval, as compared with 2,846 ships with 885,037 n.r.t. in 1933. Out of this total, the foreign traffic amounted to 1,285 ships with 809,271 n.r.t. The total volume of traffic was larger in 1934 than it had been at any time during the past five years. The n.r.t. of the coastal traffic showed a 51.8 per cent. increase over that of the previous year, and the ocean-going traffic a 1.6 per cent. increase. The goods turnover in foreign traffic amounted to 529,552 tons, as compared with 406,337 tons in the previous year, the greatest improvement being in exports, which showed a 30 per cent. increase.

Acceptance Trials of Two Diesel Engines for a Dock Fire Float

By A. O. HELPS, M.I.Struct.E., A.M.I.Mech.E., Mechanical Assistant to the Port of Bristol Authority

THE Diesel Engine, due to its greater thermal efficiency and the cheapness of its fuel, will ultimately displace the steam or petrol engine in many fields of power transmission.

Of recent years many conversion schemes have been carried out. In dock and harbour use these have mainly been confined to tugs, floating grain elevators, fire-floats, etc. The Port of Bristol Authority has carried out several of these conversion schemes, and considerable saving has been shown in the case of floating grain elevators, due principally to the elimination of steam raising, stand-by time, and the cutting down of personnel required to man the craft.



The Petters' 4-cyl. 55-b.h.p. Cold Starting Atomic Diesel Engine.

The author has had the advantage of carrying out the acceptance trials of all the Diesel engines employed, and whilst being fully aware that summaries of Diesel engine trials have from time to time appeared in the Press, he considers that a description of the actual testing methods employed and the complete calculations for a test would be of interest to many docks and other engineers, particularly as the employment of this form of power transmission is rapidly increasing as existing machinery depreciates or becomes obsolete.

The result of the test serves to show the present state of development of this type of unit.

The test selected for description is that recently carried out on one of two engines fitted to a harbour fire float, the float, in addition to having a new hull, was converted from petrol engine to Diesel engine operation early in 1934.

The port and starboard Diesel engines were coupled by a Hans Renold silent chain drive to the existing Merryweather Hatfield type fire pumps, each pump having a capacity of 330 gallons per minute at 150 lbs. per sq. in. By means of clutch operation the engines can be used either to propel the float or drive the fire pumps.

Description of Diesel Engines.

Each engine is a four-cylinder unit operating on the two-stroke cycle with crank case compression, and each rated 55 b.h.p. at 575 r.p.m. The type is known as the Cold Starting Atomic Diesel, and is manufactured by Messrs. Petters, Ltd., of Yeovil.

It will suffice to here describe the testing of the starboard engine only, as the methods employed for testing and the actual test results were very similar in each case.

Scope of Tests.

(a) To determine the b.h.p. output and fuel consumption at various loads.

(b) To measure the rate of lubricating oil consumption and to certify from subsequent examination that the bearings, cylinder walls, gudgeon pins, etc., were adequately lubricated.

(c) To certify that the normal rated output at full load is reasonably within the capacity of the engine.

(d) To observe the temperature of the exhaust gases and the ingoing and outgoing cooling water.

(e) To examine the principal working details at the conclusion of the trials.

After the preliminary examination and approval of the arrangements for the test, including the balancing of the Heenan and Froude Dynamometer arm, checking of the brake constant, and loading weights, the following tests were run:

(a) Full load test, fuel and lubricating oil consumption observed (five hours' duration).

(b) Ten per cent. overload test (one hour's duration).

(c) Three-quarter load test (fuel consumption noted).

(d) Half-load test (fuel consumption noted).

(e) Governing test.

(f) Slow-running test with no load to determine the slowest idling speed with regular firing from all four cylinders.

Notes on Tests.

Cold Starting.—The engines were thrice started from cold, and on each occasion they started quite easily and without any hesitation. I was informed that the calorific value of the fuel used on test was 19,625 b.t.u.s. per pound, and this figure has been used in calculations establishing the brake thermal efficiencies of the engines (samples were taken for analysis).

Maximum Initial Explosion Pressure at Full Load.—This pressure was 730 lbs. per sq. in., and was checked in each cylinder by indicator cards; all four cylinders were very evenly matched (the object of this observation being to ascertain whether all four cylinders were developing equal b.h.p.).

Method of Measuring Fuel Consumption.—Fuel oil was weighed very accurately in 10 or 5-lb. lots, as convenient for the load and period of time between observations. A stop watch was started when the receding level of oil dropped from the point of a rod suspended rigidly in the special fuel measuring tank. The weighed fuel oil was then added and the time noted when the oil again dropped from the point of the rod.

Exhaust Gas Temperatures.—These were read by mercury thermometers placed in pockets close to the exhaust ports of each cylinder and the mean of two readings taken.

The relation between the exhaust gas temperature and the load practically follows a straight line law, as will be seen from the temperature load graph, where the gas temperatures are plotted against the load. It is this feature which provides such a simple yet valuable guide to those later responsible for running the engine on commercial load, as should any abnormality develop within the engine it will be immediately reflected in the relation between the exhaust temperature and the load.

Engine Performance.—The principal observations and calculations for the various tests are shown for each individual test, and a summary has been prepared.

A graph showing the concordance of these results is given and is indicative of the consistent results obtained throughout the range of output.

The flatness of the fuel consumption curve between 41.25 b.h.p. and 60.5 b.h.p. that is between ¾-load and 10 per cent. overload conditions should be noted. This indicates that the normal rating is well chosen. This is again confirmed by the fact that the lowest fuel consumption, viz., 0.428 lbs. per b.h.p. hour, occurs under the 10 per cent. overload condition.

Brake Thermal Efficiency.—The thermal brake efficiency of 30 per cent. on the b.h.p. rating at normal full load is a good performance for an engine of the two-stroke crank case compression type.

Lubricating Oil Consumption.—The rate of lubricating oil consumption, after allowance for reclaimed oil, was 0.01 pints per b.h.p. hour.

Speed Regulation.—A governing test was made and is recorded in the test calculations. In the matter of ready response to load changes as well as to speed regulation there was nothing to criticise. At light load uncoupled from the dynamometer it was demonstrated that the engine would run at 225 r.p.m. for several minutes without missing on any cylinder and without nursing.

Crankshaft Alignment.—This should always be very accurately checked, as mal-alignment results in crankshaft fracture. The alignment was tested by means of a special dial gauge placed between the crank webs and found to be less than .001" deflection for the worst conditions.

Inspection after Trials.—A close examination of the mechanical details was made after the conclusion of the trials, all four lines being entirely dismantled for this examination. The small end bearings were in excellent condition, showing that lubrication of this most important part had been thoroughly effective. The big ends and the main crankshaft

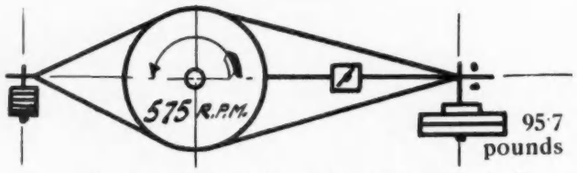
Acceptance Trials of Two Diesel Engines—continued

journals were also in excellent condition. The workmanship was sound, and as the b.h.p. output, fuel consumption, etc., were quite satisfactory, the engines were accepted as complying with the maker's specification.

Actual Test Calculations (Starboard Engine):

Full Load Test 55 B.H.P. at 575 r.p.m.

Test 5-hours duration.



Brake Constant BHP = $\frac{WN}{1000}$ Where W = weight in lbs. N = revs. per minute

BHP = $\frac{95.7 \times 575}{1000}$ = 55 BHP

Note engine run one hour before taking fuel tests.

Full Load Fuel Consumption.

10-lbs. oil in 25.166 mins.
10-lbs. oil in 25.166 mins. } Average time = 25.277 mins.
10-lbs. oil in 25.500 mins.

Therefore oil burnt per hour at full load = $\frac{10 \times 60}{25.277}$ = 23.75 lbs.

Therefore Fuel per B.H.P. hour at full load = $\frac{23.75}{55}$ = .432-lbs.

Fuel per B.H.P. hour at Full Load = .432 pounds.

Brake Thermal Efficiency at Full Load.

Fuel per Engine hour = 23.75 pounds.
Calorific value of Fuel = 19,625 B.T.Us. per lb.

Therefore heat supplied per B.H.P. hour = $\frac{23.75 \times 19625}{55}$ = 8,470 B.T.Us. per B.H.P. hour.

Note the Heat Equivalent of 1 H.P. hour = 2,545 B.T.Us.

One H.P. hour is a definite amount of mechanical energy, viz:— 33,000 × 60 = 1,980,000 foot pounds. The mechanical equivalent of heat in B.T.Us. One B.T.U. = 778 foot pounds, hence—

One H.P. hour = $\frac{1,980,000}{778}$ = 2,545 B.T.Us.

Therefore Brake Thermal Efficiency = $\frac{2545}{8470}$ = 30 per cent.

Lubricating Oil Consumption (5-hours observation) from 10 a.m. to 3 p.m.

Oil added to lubricator = 9.00 pints.
Oil reclaimed for filtering = 6.00 pints.
Therefore actual pints used = 3.00 pints.

Lubricating oil consumption in pints per B.H.P. hour after allowing for reclaimed oil = $\frac{3}{55 \times 5}$ = .0109 pints per BHP hour.

Specified at .01 pints per BHP hour.

General Remarks.

On completion of five hours' full load test, the temperature of the ingoing cooling water was 81° Far.

The exhaust gas temperature being 419° Far. average.

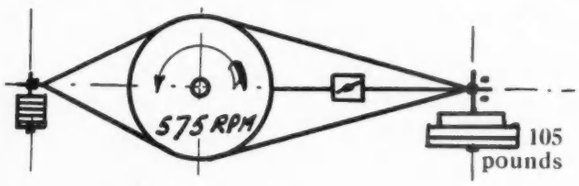
The maximum initial pressures in each cylinder were well balanced at 730 lbs. per sq. in., and were taken by means of the usual indicator.

The temperature of the lubricating oil in circulation on completion of five hours' full load test was 140°.

Temperature of shop 73° Far.
Exhaust 419° average.
Cooling water inlet 81° Far.
Outlet 105° Far.

10 per cent. Overload Test.

One hour 60.5 B.H.P. at 575 r.p.m.



B.H.P. = $\frac{105 \times 575}{1000}$ = 60.5 BHP

Fuel Consumption.

(1) 10-lbs. Fuel in 23.2 mins.
(2) 10-lbs. Fuel in 23.2 mins. } Average = 23.16 minutes.
(2) 10-lbs. Fuel in 23.1 mins.

Therefore Fuel per hour = $\frac{10 \times 60}{23.16}$ = 25.9 pounds.

Therefore Fuel per B.H.P. hour = $\frac{25.9}{60.5}$ = .428 pounds.

10 per cent. overload Fuel per B.H.P. hour = .428 pounds.

Brake Thermal Efficiency.

Fuel per hour = 25.9 pounds.

Therefore Heat supplied per B.H.P. hour = $\frac{25.9 \times 19625}{60.5}$ = 8400 BTUs.

Heat Equivalent one H.P. hour = 2,545 BTUs.

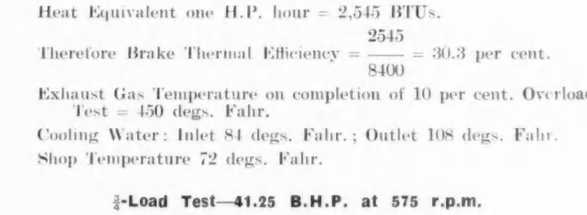
Therefore Brake Thermal Efficiency = $\frac{2545}{8400}$ = 30.3 per cent.

Exhaust Gas Temperature on completion of 10 per cent. Overload Test = 450 degs. Fahr.

Cooling Water: Inlet 84 degs. Fahr.; Outlet 108 degs. Fahr.

Shop Temperature 72 degs. Fahr.

¾-Load Test—41.25 B.H.P. at 575 r.p.m.



B.H.P. = $\frac{71.75 \times 575}{1000}$ = 41.25 BHP.

Acceptance Trials of Two Diesel Engines—continued

Fuel Consumption.

(1) 3-lbs. Fuel in 9.5 mins.
(2) 3-lbs. Fuel in 9.66 mins. } Average = 9.57 mins.
(3) 3-lbs. Fuel in 9.55 mins.

Fuel per hour at ¾ load = $\frac{3 \times 60}{9.57}$ = 18.8 pounds.

Therefore Fuel per B.H.P. hour = $\frac{18.8}{41.25}$ = .456 pounds.

Fuel per B.H.P. hour at ¾ load = .456 pounds.

Brake Thermal Efficiency.

Fuel per hour = 18.8 pounds.

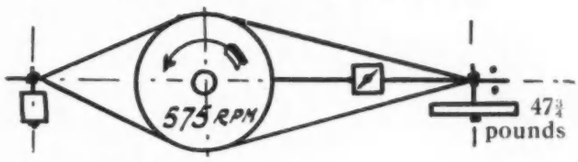
Heat supplied B.H.P. hour = $\frac{18.8 \times 19625}{41.25}$ = 8940 BTUs.

Heat Equivalent of one H.P. hour = 2545 BTUs.

Therefore Brake Thermal Efficiency = $\frac{2545}{8940}$ = 28.5 per cent.

Temperature of Exhaust Gases Average 351 degs. F.
Cooling Water: Inlet 73 degs. F.; Outlet 93 degs. F.
Temperature of Shop 64 degs. F.

½-Load Test—27.5 B.H.P. at 575 r.p.m.



B.H.P. = $\frac{47.75 \times 575}{1000}$ = 27.5 BHP.

Fuel Consumption.

(1) 3-lbs. Fuel in 12.6 mins.
(2) 3-lbs. Fuel in 12.633 mins. } Average = 12.605 mins.
(3) 3-lbs. Fuel in 12.583 mins.

Fuel per hour = $\frac{3 \times 60}{12.605}$ = 14.26 pounds.

Fuel per B.H.P. hour = $\frac{14.26}{27.5}$ = .519 pounds.

Fuel per B.H.P. hour at ½ Load = .519 pounds.

Brake Thermal Efficiency.

Fuel per hour = 14.26 pounds.

Heat supplied per B.H.P. hour = $\frac{14.26 \times 19625}{27.5}$ = 10,150 BTUs.

Heat Equivalent of one H.P. hour = 2545 BTUs.

Therefore Brake Thermal Efficiency = $\frac{2545}{10150}$ = 25 per cent.

Temperature of Exhaust Gases—Average 302 degs. F.
Cooling Water: Inlet 80 degs. F.; Outlet 96 degs. F.
Temperature of Shop 67 degs. F.

GOVERNING TEST.

Full load—55 B.H.P. at 575 r.p.m.

Condition	R.P.M.	Actual speed variation
Full Load Steady	575	—
No Load Momentary	645	12%
No Load Steady	618	7⅞%
Full Load Momentary	545	11.8%
Full Load Steady	575	—

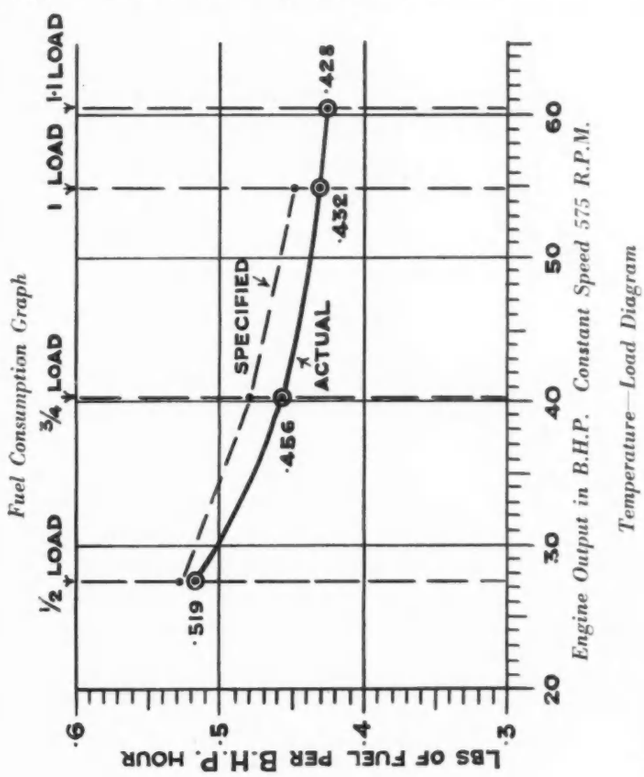
CRANKSHAFT ALIGNMENT AFTER WORKS TEST TAKEN BY MEANS OF CLOCK DIAL INDICATOR BETWEEN CRANK WEBS

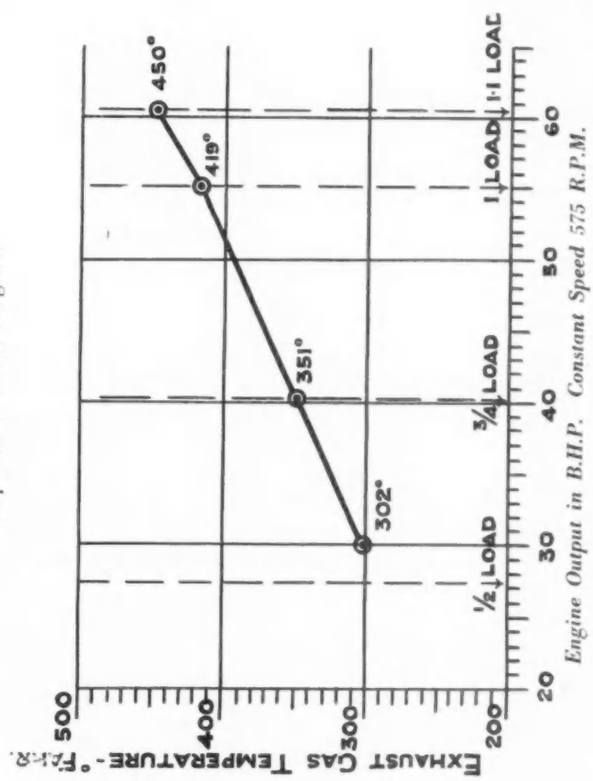
Line Number	Dial Reading Crank Pin at BDC	Dial Reading Crank Pin at TDC	90
No. 1 Fuel pump end	Zero	.001 closed	.0005 closed
No. 2	Zero	Zero	Zero
No. 3	Zero	Zero	Zero
No. 6 Flywheel end	Zero	Zero	.0005 closed

BDC denotes Bottom dead centre.
TDC denotes Top dead centre.

SUMMARY OF TEST RESULTS.

Nature of Test	BHP	RPM	Fuel in pounds per hour	Fuel per BHP hour actual	Fuel per BHP hour specified	Brake Thermal efficiency	Cooling Water Inlet	Cooling Water Outlet	Temperature of Exhaust
Full Load	55	575	23.75	.432	.45	30% actual 29% specified	81°	105°	On completion of 5 hours test. 419° F.
10% Overload	60.5	575	25.9	.428	Not specified	30.3% actual	84°	108°	450°
¾-Load	41.25	575	18.8	.456	.48	28.5% actual	73°	93°	351°
½-Load	27.5	575	14.26	.519	.525	25% actual	80°	96°	302°





News from all Quarters

South Africa

The traffic through the main ports of South Africa for the month of November, 1934, will be seen from the following table:—

	Cape Town	Port Elizabeth	East London	Durban
No. of Ships	179	82	100	245
Freight in Tons				
Unloaded	110,907	39,246	36,344	162,878
Loaded	66,412	24,056	10,966	264,827
Reloaded	1,231	24	3	2,097
Total ...	178,550	63,326	47,313	429,802

French Possessions

During the year 1934, the total number of ships entering the Harbour of Tunis was 1,484 with a cargo of 370,473 tons. The lowest import was in the month of May, when only 115 ships with a cargo of 20,602 tons entered the harbour, and the highest was in April, when 120 ships with 24,964 tons entered. The worst month for exports was March, when only 24,964 tons of goods were despatched, and the best was July, when 60,960 tons of goods were shipped on 141 vessels. The average monthly turnover of only 60-70,000 tons of goods contrasts most unfavourably with the 180,000 tons which is reckoned as the average monthly turnover in successful trading years.

U.S.S.R.

As a consequence of the general decline of Russian export trade, the turnover of the Harbour of Odessa fell further during the year 1934. Whilst in the year before the War it exceeded 4,000,000 tons, and as recently as 1931 was still in the neighbourhood of 3,000,000 tons, in 1934 it was estimated at only 1,500,000 tons, or 2,000,000 tons. This is due mainly to the decline of ocean-going traffic, as both large and small coastal traffic has actually increased, as compared with 1933. The large scale coastal traffic lay principally between Odessa and Vladivostock, and consisted of food and iron goods, whilst the smaller coastal traffic increased owing to the larger quantities of fruit and vegetables to be transported. The fall in the traffic of the harbour is due not only to the reduced export capabilities of the U.S.S.R., but also to the deliberate limitation by the Government of imports. There are no hopes of any improvement of the present situation in the near future.

Rumania

During the year 1934 the number of vessels entering the harbour of Constanza was 1,850 with 5,039,000 r.t., and the number clearing 1,862 with 5,084,000 r.t. This constitutes an increase of about 113 vessels with 170,000 r.t. over the traffic in 1933, whilst the 1933 figures were already higher than those of 1932. In spite of efforts to encourage the export of wood and grain through the harbour, Constanza has remained primarily a petroleum harbour. The Rumanian Government has also been making efforts to develop the importance of Constanza at the expense of the ports up the Danube, but so far without any noticeable success.

Spain

The number of ships entering and clearing the harbour of Cartagena during the year 1934 was 951 with a total tonnage of 1,442,817 n.r.t.

Bulgaria

During the year 1934, 472 steamers with a tonnage of 1,395,420 n.r.t. entered the harbour of Varna. Although no complete figures are available for the goods traffic handled, it is known that Germany, Italy, Great Britain and Holland (the principal countries from whose ships goods were landed) unloaded some 26,760 tons, as compared with 24,276 tons in 1933. Similarly, Italy, Greece, Germany, Great Britain and Holland loaded 79,964 tons in 1934, as compared with 111,624 tons in 1933.

Sweden

The Helsingborg harbour authorities have placed with the Stockholm firm of A/B Armator a contract for the construction of a large new dry dock for use in the port. It will be capable of taking vessels of up to 7,000 tons, and will cost in the neighbourhood of £50,000. Work on it is to be commenced immediately.

In January of the current year, 236 ships with a tonnage of 272,560 n.r.t. entered and cleared the harbour of Stockholm, as against 262 ships with 228,461 n.r.t. in December, 1934, 313 in November, 1934, 227 in January, 1934, and 207 in December, 1933.

It is now learnt that traffic in the harbour of Gothenburg rose in 1934 by about 6 per cent. above the 1933 figures. Thus, whilst vessels with 11,192,000 n.r.t. entered and cleared in 1933, the tonnage increased in 1934 by 635,000 n.r.t. to 11,827,000 n.r.t. For this increase, ocean-going traffic was responsible to the extent of 381,000 n.r.t., and coastal traffic to that of 254,000 n.r.t.

Traffic in the harbour of Malmö also showed a considerable increase. The tonnage of vessels rose from 1,282,400 n.r.t. in 1933 to 1,386,700 n.r.t. in 1934, and their number from 16,428 in 1933 to 17,106 in 1934.

Norway

The contract for the construction of the new 375 ft. long deep-water quay at Kristiansand has been awarded to the firm of Höyer-Ellefson, who have at the same time received another contract for the erection of a large new silo.

The total length of the quays in the harbour of Oslo has now been increased to 11,407 metres, of which 6,520 metres are intended for the use of sea-going traffic.

In spite of the unfavourable economic situation, the traffic in the harbour of Oslo has risen within the last few years. In 1934 the port was visited by 2,857 ships with 3,166,200 n.r.t., as compared with 2,801 ships with 3,086,300 n.r.t. in sea-going traffic in 1933, and by 24,400 ships with 1,856,000 n.r.t. in coastal traffic, as compared with 20,100 ships with 1,767,500 n.r.t. in 1933. It will be seen that this constitutes an increase of 4,356 ships and 168,400 n.r.t.

Denmark

In the year 1934 the total number of steam and motor vessels visiting the harbour of Copenhagen was 9,377 with a tonnage of 4,818,831 n.r.t.

The following table affords a survey of the goods turnover in the harbour during the first three quarters of the year 1934, as compared with 1933:—

Goods Unloaded (in Tons).

	Coastal Traffic		Seagoing Traffic		Total Traffic	
	1933	1934	1933	1934	1933	1934
Jan.-March ...	105,710	151,171	920,909	1,018,639	1,026,619	1,169,810
April-June ...	181,968	191,980	748,880	812,082	930,848	1,004,062
July-September	185,320	199,040	958,968	1,028,978	1,144,288	1,228,018
Goods Loaded (in Tons).						
Jan.-March ...	112,059	133,111	170,774	171,243	282,833	304,354
April-June ...	112,413	115,210	168,867	173,949	281,280	289,159
July-Sep. ...	129,424	138,725	167,984	177,885	297,408	316,610

Belgium

In January, 1935, 835 ocean-going vessels entered the harbour of Antwerp with a tonnage of 1,685,956 r.t., as compared with the 804 vessels with a tonnage of 1,702,272 r.t. in the same month of the previous year.

The total sea-going traffic in the harbour of Brussels amounted, in 1934, to 1,764 ships transporting 841,960 tons. In comparison with the 1933 figures, this represents a decrease of 57 ships, but an increase of 4,957 tons in the consignments of goods handled.

Latvia

In the last quarter of 1934, 181 vessels with a tonnage of 59,682 entered the harbour of Libau. During the same period, the number of ships clearing was 176 with 58,562 n.r.t. Imports (including transit traffic) rose from 25,832 tons in the third quarter to 39,838 tons in the last quarter of the year, whilst exports increased over the same periods from 15,813 tons to 19,432 tons.

Final Dividends of Vickers, Ltd.

The Directors give notice that the following Final Dividends for the half-year ended 31st December, 1934, will be paid to the Holders of the Preferred Stock and Preference Shares of the Company, who are registered in the books of the Company on Saturday, the 2nd March, 1935:—

- 2½ per cent. on the Preferred 5 per cent. Stock (less Income Tax).
- 2½ per cent. on the 5 per cent. Preference Shares (less Income Tax).
- 2½ per cent. on the Cumulative Preference Shares (free of Income Tax).

Payment will be made on Friday, the 29th March, 1935.

The Register of Members relating to these Issues will be closed from Monday the 4th to Saturday the 9th March, 1935, inclusive.

North-East Coast Notes

Discussion on Importation of Petroleum into the Tyne.

THE question, at once important and interesting, of the importation of petroleum into the Tyne in its upper reaches, was discussed at the meeting of the Tyne Improvement Commission in January, and at the time of writing was still unsettled. The subject arose on a report of the Harbour and Ferry Committee, presented by Alderman Thomas Sykes, from which it appeared that the Anglo-American Oil Co., Ltd., had applied for permission to import petroleum spirit in bulk into the Tyne in full cargoes of 1,000 tons, or part cargoes up to 500 tons in 1,000-ton coasting tankers for discharge at the Company's wharf at Elswick.

The Oil Sub-Committee had decided to re-affirm decisions arrived at in respect of previous similar applications from the Company—that the application was one which could not be agreed to. The Harbour and Ferry Committee had adopted the minutes of the Sub-Committee and recommended accordingly. Alderman Sykes moved the adoption of the report, which Mr. J. W. Mitchell seconded.

Navigation Risks.

Councillor R. S. Dalgliesh, Lord Mayor of Newcastle, moved an amendment that the application be allowed under certain restrictions. He believed that if this request were granted, the Company would take over Herring's Wharf, now a timber yard. Petroleum was permitted to be imported through the Manchester Ship Canal and at various depots elsewhere, and could be brought up the Thames in 300-ton lots past the Houses of Parliament. Opponents spoke of the risk from fire and explosion, but they had got oil tanks at Jarrow, and shipowners were allowed to bring ships up the Tyne with Diesel oil in tanks. The Harbour Master seemed to be afraid that petrol-laden tanks might strike the Swing Bridge in going through, but they had been bringing ships up for years, and barges were only 32 ft. beam, leaving 33½ ft. on either side. That district lived by shipping, and it was up to them to develop their trade.

Mr. H. Armstrong seconded, saying that there was no difficulty at Middlesbrough or on the Tees as regards petroleum.

Alderman A. L. Armstrong said the risk to navigation in the river was grossly exaggerated. Even if there was a collision at the Swing Bridge, it did not follow that a quart of oil would come out.

Alderman Sir George Lunn supported the Lord Mayor. There seemed to be a lot of documents that they had not seen, and he would like to see them. He suggested that they should adjourn their decision and that the discussion be printed, together with any documents that had been before the Oil Committee.

Alderman Sir Arthur W. Lambert seconded.

Alderman R. Irvin agreed that the matter should go back.

Mr. T. E. Brown said he had come to the conclusion that, notwithstanding the Harbour Master's report, provided a deep water berth was made at Elswick, and if the barges were properly convoyed up the river, there would not be the danger that some seemed to think.

Alderman Sykes hoped that the amendment would not be accepted. His Committee was as anxious to develop trade as anyone; but they must have a minimum of danger with a maximum of safety.

Mr. W. A. Souter favoured the acceptance of Sir George Lunn's proposal, thinking that all information available should be put before all the members.

On a division, five members voted for the Lord Mayor's amendment and fourteen against. Sir George Lunn then moved that further consideration of the report of the Joint Oil Sub-Committee be adjourned, and that meanwhile a full report of all the speeches and all documents on the matter be placed in their hands. Alderman David Adams seconded.

There voted for the amendment fourteen and five were against, Alderman Sir George Lunn's amendment being carried accordingly.

The Chairman, Mr. H. P. Everett said the safety of the port was far more important than any small advantage by granting the application.

An official of the Anglo-American Oil Co., commenting later on the attitude of the Tyne Improvement Commission, stated: "In view of the fact that it is possible to take spirit in bulk for considerable distances up the Thames, the Severn, the Mersey, and that the Manchester Ship Canal authorities are at this time doing their utmost to help us to take it over 25 miles all the way up the Ship Canal, it is difficult to understand the Tyne Improvement Commission's fears about property and possible mishaps to tankers. They are only comparatively small tankers—plying between Hull and the Tyne—which we hope to be able to take up to Elswick, where there would be work for a number of men if we could only establish our depot for spirit as well as lubricating oil."

Records of Quick Work.

Another quick-loading feat has been accomplished at Tyne Dock, where 500 tons of sulphate of ammonia were loaded at the rate of 100 tons per hour. This feat was performed by Messrs. J. Kirkley and Co., stevedores, of Newcastle, and the London and North-Eastern Railway Co., the chemicals being loaded into the steamer "Marchioness" in the first week in February. About a fortnight previously, the same firm loaded the steamer "Tora" with 500 tons in 7½ hours.

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Another instance of smart work was when the oil tanker "Aino" recently took in 2,200 tons of creosote oil within ten hours at Messrs. Sadler and Co.'s works at Middlesbrough. This is one of the biggest oil cargoes ever taken from the port. The oil is intended for the Gulf of Mexico for the preservation of timber. The oil is forced through an underground pipe-line to the docks and into the holds of the vessel by means of a steam-pump at the rate of 40,000 gallons per hour.

Blyth's New Record.

Mr. Ridley Warham, chairman of the Blyth Harbour Commission, had the pleasure, at the meeting at the latter part of January, of submitting figures as to coal shipments, which disclosed another record for the port. The coal shipments for the twelve months ended December 31 last, with the comparative figures for 1932 and 1933, were as follow:—1934, 6,391,999 tons; 1933, 5,772,536 tons; 1929, 574,807 tons. Arising out of the Finance and Works Committee's recommendations, it was reported that in order to expedite the dredging work of the tidal basin extension in the Upper Harbour, a sand suction dredger might be employed temporarily for clearing the sand from the vicinity of the West Pier end.

Review of Wear Trade.

The River Wear Commission's return of trade at the port during the year 1934 has just been issued, and furnishes some striking figures. During the year 2,565 vessels, registering 1,951,699 tons cleared the port, 1,789 vessels of 1,019,511 tons net register being coasting trade; 652 vessels of 652,464 tons European trade, and 124 vessels of 289,724 tons beyond Europe. Compared with 1933, there was an increase of 21 vessels, but a decrease of 47,292 net register tons. Tonnage rates received amounted to £57,559, against £58,606 in 1933. The coal and coke shipments for the twelve months were 3,995,813 tons, compared with 4,075,549 tons, a decrease of 79,736 tons. Other leading exports were:—Machinery, 2,029 tons, against 1,432 tons in 1933; pitch and tar, 15,516 tons, against 10,864 tons; creosote oil, 5,987 tons, against 3,335 tons; petroleum and benzole, 9,621 tons, against 14,041 tons, and pit props 6,559 tons, against 6,287 tons.

The principal imports were:—Timber, 27,007 loads, against 19,804 loads in 1933; props, 104,680 loads, against 84,573 loads; iron ore, 34,725 tons, against 9,627 tons; grain, 49,491 quarters, against 64,977 quarters; esparto, 21,473 tons, against 20,259 tons; petroleum in bulk, 80,145 tons, against 79,373 tons, and sundries, 30,618 tons, against 41,447 tons.

Bombay Port Trust

At a meeting of the Trustees of the Port of Bombay, held on 29th January, 1935, the following were the main items of business disposed of:—

The election by the Chamber of Commerce of Mr. F. H. French as a member of the Board of Trustees *vice* Mr. T. E. Cunningham resigned, was recorded.

Audited accounts for the half-year ended 30th September, 1934, were approved for submission to Government.

An estimate of Rs. 55,125 was sanctioned for re-paving with cement concrete certain quays in Victoria Dock, as part of a programme for the gradual re-pavement of all the quays in Prince's and Victoria Docks, which have not been renewed since the docks were constructed.

Amendments of the Docks and Bunders Scales of Rates were approved (subject to the sanction of Government) to provide for a reduced rate of wharfage on old cotton healds and rags packed in bags and for a clearer classification for purpose of assessing wharfage of window, plate and sheet glass, electric light bulbs, fittings and accessories and certain other articles.

The Trustees decided to invite applications by advertisement from graduates of Indian Universities for two posts of Probationary Assistant Managers in the Docks; three of the four candidates entertained since 1928 having been absorbed in permanent appointments.